RECORD OF DECISION

WEST HIGHWAY 6 & HIGHWAY 281 SUPERFUND SITE
OPERABLE UNIT 2
HASTINGS, NEBRASKA

September 2017

Prepared by:
U.S. Environmental Protection Agency
Region 7
Lenexa, Kansas

Mary P. Peterson

Mary P. Peterson, Director
Superfund Division

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RECORD OF DECISION
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HASTINGS, NEBRASKA
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PART I: DECLARATION

Site Name and Location

Operable Unit 2
West Highway 6 & Highway 281 Superfund Site
Hastings, Adams County, Nebraska
CERCLIS ID# NEN000704738

Statement of Basis and Purpose

This Record of Decision presents the Selected Remedy for Operable Unit (OU) 2 groundwater of the West Highway 6 & Highway 281 Superfund Site (site) in Adams County, Nebraska to address historic releases of hazardous substances. The remedy was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. § 9601 *et. seq*., and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR part 300.

This Record of Decision, and all documents relied upon to make the decision, are incorporated into the Administrative Record (AR) for this site. The AR is available for public review online at:

https://cumulis.epa.gov/supercpad/SiteProfiles.........

and at the EPA Region 7 office:

EPA Region 7 Office
11201 Renner Blvd
Lenexa, Kansas 66219

The state of Nebraska concurs with the Selected Remedy.

Assessment of the Site

The interim action selected in this Interim Record of Decision (Interim ROD) is necessary to protect the public health and welfare and the environment from actual or threatened releases of hazardous substances from the site into the environment.

Description of the Selected Remedy

The West Highway 6 & Highway 281 Superfund site (site) consists of two OUs. OU 1 is the area of soil and groundwater contamination on the former Dana Corporation facility property. OU 1 includes the approximately one acre parcel (010016064) owned by the city of Hastings immediately to the east. OU 2 is defined as the contaminated groundwater plume downgradient of the former Dana Corporation facility property. The contaminants of concern (COCs) for OU 2 are the volatile organic compound tetrachloroethylene (PCE) and its degradation compounds.

The Selected Remedy is an interim action to address the contaminated groundwater plume portion (OU 2) of the West Highway 6 & Highway 281 site. The EPA's Selected Remedy for OU 2 groundwater is Alternative G4 – groundwater recovery, treatment and discharge at mid-plume and leading edge of plume areas.

Under the interim action, recovery wells will be installed on the leading edge (eastern-most, hydraulically downgradient portion) of the downgradient groundwater plume. Recovery wells will also be installed at mid-plume locations to provide for additional treatment and hydraulic control. Mid-plume recovery wells will target areas of the plume with PCE concentrations greater than 5 µg/L in the medial aquifer, generally between South Elm Avenue and Showboat Boulevard. The addition of recovery wells in the mid-plume area has been estimated to significantly reduce the timeframe for aquifer restoration. Extracted groundwater from both the leading edge of the plume and the mid-plume area will be piped to a treatment building where the water will be treated using air stripping. The treated water will be re-injected into the aquifer through a network of injection wells. The interim action includes the following components:

- Installation of recovery wells in the mid-plume area and near the leading edge of the plume.
- Construction of a piping network to transport water from the recovery wells to the treatment building that will jointly serve both the Garvey Elevator Superfund site (Garvey site) and the West Highway 6 & 281 Superfund site [hereinafter referred to as the Joint Treatment System Building (JTSB)] and from the JTSB to the injection wells.
- Construction of an air stripping treatment system within the JTSB.
- Construction of injection wells to reinject the treated groundwater back into the aquifer.
- Construction of a network of monitoring wells for performance monitoring of the remedy;
- Quarterly, semiannual and annual groundwater monitoring;
- System operations and maintenance;
- Periodic well maintenance and equipment replacement;
- Monitoring of an existing IC on the areas within or in close proximity to the contaminated groundwater plume to ensure its effectiveness;
- Decommissioning of monitoring, recovery and injection wells and air stripping treatment system after response actions have successfully concluded.

The interim action addresses unacceptable human health risks associated with the potential exposure of current residents to contaminated groundwater. There were no unacceptable exposures to ecological receptors.

The interim action does not address the soil and groundwater contamination on the former Dana Corporation facility property that constitutes the majority of OU 1. Further field investigations and studies of the feasibility of alternatives to address OU 1 are necessary before selecting a final remedy for the entire site. This interim action for OU 2 will be consistent with the final action for the entire site.

Declaration of Statutory Determinations

The interim action is protective of human health and the environment in the short term and is intended to provide adequate protection until a final ROD is signed; complies with (or waives) those federal and state requirements that are applicable or relevant and appropriate for this limited-scope action; and is cost-effective. Although this interim action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action does utilize treatment and thus supports that statutory mandate. Because this action does not constitute the final remedy for the site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be addressed by the final response action. Subsequent actions are planned to address fully the threats posed by conditions at this site. Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after the commencement of the remedial action. Because this is an interim action ROD, review of this site and remedy will be ongoing as the EPA continues to develop remedial alternatives for the site.

ROD Data Certification Checklist

The following information is included in the Decision Summary (Part II of this Interim ROD). Additional information can be found in the AR for this site.

- COPCs and their respective concentrations (see Section 8.1.1 and Table 2).
- Baseline risk represented by the COCs (see Section 8.1.4)
- Current and reasonably expected future use (see Section 7)
- Summary of COCs (Table 7)
- Cleanup levels established for the COCs (see Section 9 and Table 8)
- Source materials (see Section 12)
- Estimated costs (see Section 13.3)
- Key factors that led to selecting the remedy (see Sections 11 and 15)

Authorizing Signature

Mary P. Peterson 9/28/2017

Mary P. Peterson, Director
Superfund Division

Date

PART II: DECISION SUMMARY

1. Site Name, Location and Description

Site Name: West Highway 6 & Highway 281 Superfund Site (site)
Site Location: Hastings, Nebraska
CERCLIS ID: NEN000704738
Operable Unit (OU): OU 2

The site is located approximately 7 miles west of the Adams County/Clay County line in the southwest portion of the city of Hastings, Nebraska (Figure 1). The site consists of the former Dana Corporation property, the contaminated soils and groundwater beneath the property, and the associated contaminated groundwater plume that extends approximately two miles east of the property. The former Dana Corporation property is located at 1900 Summit Avenue in the Hastings Industrial Park West (HIPW) in Hastings, Nebraska (Adams County), in the southeast quarter of Section 14, Township 7 North, Range 10 West. It encompasses approximately 12.3 acres and includes two buildings, parking lots, and access roads (Figure 2). The main building is the 150,000-square-foot operations/production facility. A small 1,400-square-foot building located southwest of the main building houses the equipment for the remediation system on the property.

The former Dana Corporation property is zoned I-2 (heavy industrial), as is the entire Hastings Industrial Park. The current property owner is 1900 Summit Properties LLC. The current operator is Dutton-Lainson Company. Dutton-Lainson Company manufactures livestock tanks, of both plastic and galvanized steel, bale feeders, gates and panels, grain aeration tubing, rain barrels and custom fabricated metal products at the facility. The future use of the property is expected to remain industrial. The property is bounded to the north, east, and south by other industrial facilities and to the west by railroad tracks and agricultural fields. Central Logistic Services, located north of the site, provides trucking services. ThermoKing, located east of the site, manufactures climate control systems. ConAgra, located southeast of the site, manufactures food products. Great Plains Packaging, a producer of folding cartons, is located south of the site. Agricultural land is located directly west of the site beyond the railroad tracks; however, this land is zoned single family residential.

The historical operating practices of the Dana Corporation contaminated the soil and groundwater on the property with volatile organic compounds (VOCs) and metals. Groundwater contamination extends approximately two miles beyond the property boundary. For remediation purposes, the EPA has divided the site into two OUs. OU 1 is the area of soil and groundwater contamination on the former Dana Corporation facility property. OU 1 includes the approximately one acre parcel (010016064) owned by the city of Hastings immediately to the east. OU 2 is the contaminated groundwater plume downgradient from the former Dana Corporation facility property.

The EPA is the lead agency for the site and the Nebraska Department of Environmental Quality (NDEQ) is the support agency. The sources of funding for cleanup of this site will be the Superfund trust fund, state funds received through the NDEQ, and available Site-specific special account funds.

This Interim Record of Decision (Interim ROD) addresses the contaminated groundwater plume in the area designated as OU 2. Additional characterization of the contamination associated with OU 1 is planned. After these investigations are complete, the EPA plans to conduct a Feasibility Study (FS) to evaluate a range of remedial alternatives to address OU 1.

2. Site History and Enforcement Activities

This section of the Interim ROD provides the history of the site and a brief discussion of the EPA and the state's removal, remedial, and enforcement activities. The "Proposed Rule" proposing the site to the National Priorities List (NPL) was published in the *Federal Register* (FR) on September 14, 2005. The "Final Rule" adding the site to the NPL was published in the FR on April 19, 2006.

2.1 History of Property Ownership and Operations

The Hastings Industrial Park-West (HIPW) was first developed in the early 1970s. Before this time the area was used for row crop production. Between June 1978 and October 2002, the Dana Corporation operated a manufacturing facility at the subject property, producing a variety of cast piston rings for internal combustion engines. Site operations were contained within the main production building. This structure housed four degreasing units to clean the piston rings between processes or before plating. The degreasing units consisted of stainless steel tanks situated within concrete pits. The degreasing solvents used in the units were PCE, trichloroethene (TCE), and 1,1,1-trichloroethane (1,1,1-TCA). Chromium, nickel, zinc and barium compounds were used to plate the piston rings in a series of four chrome plating bath tanks.

The four degreasing units operated by the Dana Corporation were: the northern vapor degreasers No. 1 and No. 2, the central vapor degreaser unit, and the Phillips vapor degreaser unit. The locations of the degreasing units within the former Dana facility are illustrated on Figure 2 and their history of use is summarized below:

- Northern degreaser unit No. 1 was installed in March 1979 and operated until Dana Corporation ceased operation in October 2002. Unit No. 1 used primarily 1,1,1-TCA until 1993, when the solvent was switched to PCE.
- Northern degreaser unit No. 2 was installed in April 1979, and used 1,1,1-TCA until 1993, when the solvent was switched to PCE. In March 2000, Unit No. 2 was moved to near the center of the facility and operated as an aboveground degreasing unit (labeled Northern Degreaser Relocation #2).
- The central degreaser was installed in February 1987 and operated until production ceased in October 2002. As with the northern degreasing units, 1,1,1-TCA was used until 1993, when the solvent was switched to PCE.
- The Phillips degreaser was installed in December 1983 and was operated until 1997. PCE was the primary solvent used in this unit throughout its operation.

A complete list of the chemicals used in the manufacturing and plating processes is provided in the 2011 *Revised Final Remedial Investigation Report*.

The former Dana Corporation property was purchased by TAZ LLC in July 2003. TAZ LLC leased the property and buildings to Hastings Equity Grain Bin, Inc. (HEGB). At the facility, HEGB manufactured livestock tanks, of both plastic and galvanized steel, bale feeders, gates and panels, grain aeration tubing, rain barrels and custom fabricated metal products. In 2011, the property was purchased by the current property owner, 1900 Summit Properties LLC. Dutton-Lainson Company is the current operator. Dutton-Lainson continues to manufacture the same lines of products that were manufactured by the former HEGB.

2.2 State-lead Activities

The former Dana Corporation facility first came to the attention of the NDEQ in October 1998, when Dana Corporation notified the NDEQ that a degreaser (later identified as the Phillips degreaser) was recently decommissioned and removed from its concrete pit and that testing of soil beneath the pit indicated a release of PCE. Upon a request for additional information from the NDEQ in January 1999, Dana Corporation acknowledged that in 1988 there had been a leak in the degreaser which released some solvent into the pit but that the solvent had been recovered. The Dana Corporation also acknowledged that the pit was considered as secondary containment and that there may have been other incidents of accidental overfilling where solvent entered the pit, but they were not aware of other specific incidents. It was not until a subsequent EPA request for information in 2005 that Dana Corporation revealed there had been three accidental spills of PCE, caused by overfilling of the degreaser's reservoir, into the pit between 1984 and 1988 and that the degreasing solvent had flowed into the degreasing pit, with some of it leaking out of the pit and into the soil.

Dana performed self-directed investigations in 1998 and 1999 and found high concentrations of PCE in the soil directly beneath one of the degreasing pits and in the groundwater. In 1999, Dana enrolled the site in the NDEQ's Voluntary Cleanup Program (VCP), which is authorized by the Nebraska Remedial Action Plan Monitoring Act (RAPMA), and continued investigations to identify the extent of soil and groundwater contamination beneath its facility. By January 2003 Dana had installed and started operating a soil vapor extraction (SVE) system to address soil contamination beneath the facility. By October 2003, Dana had installed the first of an eventual four extraction wells of a groundwater extraction system to capture contaminated groundwater and prevent it from continuing to migrate away from the facility.

Dana continued to operate the groundwater extraction and SVE systems over the next couple of years. However, Dana Corporation was unwilling to characterize the nature and extent of groundwater contamination in areas off the Dana Corporation's property, as requested by the NDEQ. In 2004 the NDEQ collected groundwater samples from several temporary wells and from several private and municipal wells in areas downgradient of the former Dana Corporation property. Dana-related contaminants were identified at levels of concern at numerous locations. The Dana Corporation's unwillingness to address contaminants that had migrated off the facility property led to the NDEQ's December 14, 2004 request for assistance from the EPA.

In correspondence dated July 1, 2005, the NDEQ supplemented its previous request for assistance from the EPA, noting their efforts to gain voluntary compliance from Dana Corporation were unsuccessful. The NDEQ requested the EPA's assistance in requiring Dana Corporation to conduct a private well survey and provide alternate water supplies to impacted private well users, characterize the extent of contamination, continue to operate the existing source control systems, characterize the PCE plume downgradient of the facility and evaluate potential remedial alternatives for the PCE plume.

2.3 Federal-lead Activities

In response to the NDEQ's requests, the EPA assumed the role of lead agency and issued a General Notice of Liability to Dana Corporation September 7, 2005. On September 14, 2005, the EPA proposed the site for listing on the EPA's NPL. Shortly thereafter, in March 2006, the Dana Corporation declared Chapter 11 bankruptcy. The site was finalized on the NPL in April 2006, making it eligible to receive federal funding for assessment and cleanup to protect human health and the environment.

In May 2006, the Dana Corporation notified the EPA of its intent to cease cleanup activities at the site within 30 days. The EPA initiated a Removal Action in July 2006 to continue operating and maintaining the existing groundwater extraction and SVE systems. The EPA also monitored water quality in private residential/business wells downgradient of the facility and provided alternate water when the wells were found to be impacted above acceptable levels. In September 2006, the EPA began Remedial Investigation (RI) activities to identify the contaminants present in the soil and groundwater, to determine the horizontal and vertical extent of the contamination in the soil and groundwater, and to assess potential health risks that might be attributable to the contamination.

Concurrent with the EPA's site investigation activities, in September 2006 the EPA filed a claim against the Dana Corporation bankruptcy in U.S. District Court for the Southern District of New York, under authority of CERCLA, commonly referred to as Superfund. Through the bankruptcy process the EPA was able to recover slightly less than 10% of the estimated costs of completing the required work at the site.

Under its removal action authority, the EPA took over operation of the groundwater extraction and SVE systems at OU 1 in 2006, and continues this operation to date. Additionally, the EPA implemented upgrades to the systems to reduce operating costs. Prior to Dana Corporation ceasing cleanup activities in 2006, the discharge from the groundwater extraction system was routed to the sanitary sewer for treatment at the publicly-owned treatment works, which was very costly. The EPA upgraded the groundwater extraction system by adding an air-stripper system to treat the extracted water and rerouted discharge to the pond on the adjacent property. Additionally, the EPA modified the SVE system after determining the vapors from the SVE system were well below acceptable levels and could be discharged directly to the atmosphere, without treatment through the catalytic oxidation unit, which was costly to operate. Table 1 summarizes a few of the most significant repairs and upgrades performed under the EPA's removal action authority. Based on system performance data and sampling results, the groundwater extraction and treatment (GET) system at OU 1 has been effective in capturing contaminated groundwater and preventing its downgradient migration.

In March 2011, the EPA completed RI activities, which fully characterized the nature and extent of contamination in soil and groundwater for the entire site, OUs 1 and 2. The RI activities included a human health risk assessment (HHRA) and screening level ecological risk assessment. The HHRA identified a number of metals and VOCs as contaminants of potential concern (COPCs), a few of the metals being naturally occurring in the environment. In November 2011, the EPA completed an assessment of the role of background concentrations of metals in soil and groundwater to remove background levels from the risk calculations. In May 2012, the EPA developed a draft FS report that presented the development and full evaluation of remedial action alternatives to address the entire site.

Changes in toxicity parameters since the time of the 2011 HHRA and changes in assessing the potential for vapor intrusion led the EPA, in 2016, to update the HHRA for the entire site.

In July 2017, the EPA modified and then finalized an FS report that developed and evaluated alternatives to address the OU 2 contaminated groundwater plume.

In July 2017, the EPA completed the FS and issued an FS Report that presented the development and full evaluation of RA alternatives to address OU 2 of the site.

3. Community Participation

Community-relations activities for the site were initiated by the EPA in September 2005. Early community-relations activities included: meeting with city and state officials to discuss the site, conducting interviews with private citizens, business owners, and local officials and establishing an information repository. Since 2005, the EPA has conducted periodic meetings with city of Hastings' officials to update them regarding site work, investigation findings, and to hear the city's concerns about the project. Fact sheets containing information about the site have been mailed to public officials, businesses and numerous citizens. The availability of an EPA technical assistance grant was announced to the public in April 2006. A community involvement plan was finalized in December 2006.

The RI/FS and the Proposed Plan for Interim Remedial Action (RA) at OU 2 (Proposed Plan), as well as other supporting documents, were made available to the public in an Administrative Record (AR) on August 15, 2017. The AR was made available to the public on the site's profile page at the internet link https://semspub.epa.gov/src/collections/07/AR63356. The EPA held a public-comment period from August 15 to September 15, 2017, following the release of the Proposed Plan. The Proposed Plan identified the Preferred Alternative to address the contaminated groundwater plume at OU 2. On August 23, 2017, the EPA conducted a public meeting to discuss the EPA's Preferred Alternative for OU 2 and to receive citizens' comments and questions. The EPA did not receive any comments during the public-comment period. The Responsiveness Summary is included as Part III of this Interim ROD.

4. Scope and Role of the Operable Units and Response Action

The site covers a large geographical area and encompasses both contaminated soil and groundwater at the source area and an associated contaminated groundwater plume extending to approximately two miles east-southeast from the source area. The EPA has organized the site into two operable units:

OU 1 – The area of soil and groundwater contamination that is generally within the boundaries of the 12.3-acre property (Adams County parcel ID 010015274), commonly referred to as the source area.

OU 2 – The area of contaminated groundwater that extends to the east-southeast from OU 1 in the direction of groundwater flow. Because the plume of contaminated groundwater continues to migrate and spread with time, the extent of OU 2 may change. The boundary of OU 2 is defined as near the maximum horizontal extent of contaminated groundwater that exceeds the Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs), regardless of depth in the aquifer (refer to Figures 4 and 5).

This is the first ROD for the site. This Interim ROD addresses the entirety of OU 2. This Interim ROD is intended to address the risk to human health posed by the contaminated groundwater at OU 2, to prevent further spread of the OU 2 plume and to restore the aquifer to its beneficial use. Further studies of the feasibility of alternatives to address OU 1 source area are necessary before selecting a final remedy for the entire site. The EPA's removal program will continue to operate and maintain the existing groundwater extraction and SVE systems at OU 1 until the final remedy is implemented. This interim action will be consistent with the final remedy.

5. Conceptual Site Model

Health risks may occur when there is contact with a chemical by a receptor population. Exposed populations may ingest, inhale, or dermally absorb a COPC to complete an exposure pathway and potentially experience an adverse health risk. Exposure pathways are determined by the locations of sources, types of release mechanisms, types of contaminants, fate and transport mechanisms, and the locations and activities of the receptors. Figure 7 is a conceptual site model (CSM) that tracks the pathway from its primary source, through possible routes of exposure, and to the potential receptor. The CSM was developed during the planning phase, prior to the EPA conducting field investigation activities during the RI. The CSM was refined as more information became available.

A range of potential human receptors, both current and future, could potentially be exposed. These include the off-property resident, indoor industrial worker, outdoor industrial worker, trespasser, future construction worker and future on-property resident. For purposes of the CSM, future scenarios are hypothetical and assume unlimited and unrestricted use.

The soil at OU 1 was contaminated with VOCs (primarily PCE) and possibly metals as a result of releases. The release mechanism of leaching resulted in transport of PCE to the water table where it then impacted the groundwater and migrated in the general direction of groundwater flow.

This Interim ROD addresses the contaminated groundwater at OU 2. The potential human receptors that could be exposed to the contaminated groundwater of OU 2 include current off-property residents. Detailed information CSM and further explanation about potential exposure pathways and potential receptors at OU 1 can be found in the HHRA of the *Revised Final Remedial Investigation Report* (2011).

6. Site Characteristics

This section of the Interim ROD provides a brief overview of the site, including its physical description, climate setting, topography, hydrology, geology, hydrogeology, the nature and extent of contamination and the CSM. This summary of the site characteristics is based on previous investigations and response actions conducted by Dana Corporation, investigations conducted by the NDEQ and investigations and removal actions conducted by the EPA. Detailed information about the site's characteristics can be found in documents in the AR, specifically the *Revised Final Remedial Investigation Report* (2011) and the *Final OU 2 Feasibility Study Report* (2017).

6.1 Physical Characteristics

Regionally, the site is located within the Loess Plains, a portion of the Great Plains physiographic province. The site is located in the HIPW, with adjacent properties to the north, east and south being occupied by industrial facilities. Topography of the area is relatively flat, with a slight slope to the east-southeast. A railroad embankment exists to the west, beyond which the land is used for agricultural purposes. On-site drainage flows in several directions, but mainly east along a drainage ditch toward Centennial Avenue and southeasterly toward Summit Avenue. A 0.5-acre pond is located east of the former Dana Corporation property. Regionally, surface water flow is toward the south-southeast to the Little Blue River approximately 10 miles away. Pawnee Creek, the nearest named perennial surface feature, is as close as 0.5 miles south-southeast of the site.

6.1.1 Site Geology

The general stratigraphy of Adams County is summarized from test hole drilling, monitoring well drilling, lithologic sampling and downhole geophysical logging conducted across the aerial extent of OU 1 and OU 2. These data show a general sequence of eolian silts and fine sands with occasional interbedded alluvial sediments, overlying coarser sands and gravels. These sediments are Recent to Pleistocene in age, and range in thickness from 180 to 240 feet. These sediments overlie Cretaceous-age bedrock.

The geologic units and their associated geologic characteristics are as follows:

Pleistocene Loess – The Pleistocene Loess is broken down into two units, the Wisconsinan Stage Peoria Loess and the Illinoisan Stage Loveland Formation. Locally, the Peoria Loess is brown/yellowish-brown and composed of predominantly silt- and fine silt-sized particles, with some clay and little sand. The Loveland is generally sandier than the Peoria, and shows greater paleosol development. Loveland sediments are also generally redder than the Peoria. These deposits consist of occasionally sandy silts and clays, and are up to 70 feet thick. Paleosols and thin lenses of coarser-grained alluvial/fluvial sediments are present.

Pleistocene Sand and Gravel – The Pleistocene age sands and gravels occur below the loess units and extend to the bedrock surface at approximately 233 below ground surface (bgs). These are alluvial deposited sands and gravels containing thin layers of clay and silt. One notable silty clay/clayey silt unit is found to underlay the site from approximately 124 to 130 ft bgs. The silty clay/clayey silt layer is somewhat laterally extensive, and appears to slope gently to the east-southeast and with its thickness gradually decreasing towards the south. The thickness of the Pleistocene Sand and Gravel ranges from 130 to 180 feet. Gravel beds within this unit can be as thick as 10 feet. The Pleistocene sands and gravels lie unconformably on the Cretaceous bedrock. Note that the Ogallala Formation is not present beneath the site; however, it does overlie the bedrock over about one-fifth of Adams County.

Cretaceous Bedrock – The bedrock beneath the Pleistocene Sand and Gravel in Adams County represents an erosional terrain developed on the Cretaceous age Niobrara Formation, and in some areas, remnants of the Cretaceous age Pierre Shale and the Miocene/Pliocene age Ogallala Formation. Beneath the site, the bedrock is the Niobrara Formation, which consists of yellow and light to dark-gray marine chalky shale and chalk.

6.1.2 Site Hydrogeology

The Pleistocene sands and gravels, and where present, remnants of the Ogallala Formation, are commonly referred to as the northern High Plains aquifer or Pleistocene aquifer. Beneath the site, the Pleistocene aquifer extends from the water table at about 115 feet bgs to the top of the weathered shale surface of the Niobrara Formation at about 230 feet bgs. The Pleistocene aquifer is typically 100 to 150 feet thick in the Hastings area. The regional groundwater flow direction is toward the east/southeast. The aquifer is highly transmissive, with historical transmissivity estimates ranging from 50,000 gallons per day per foot (gpd/ft), in the northeastern part of Adams County to more than 200,000 gpd/ft in the central part of the county. Groundwater from the Pleistocene aquifer in the Hastings area is utilized for municipal, domestic and agricultural use. Due to the heavy use of the resource, the water table in the aquifer has dropped more than 20 feet since the 1950s to 1992.

Conceptually, the Pleistocene aquifer beneath the site has been divided into two aquifer zones: upper (A zones) and lower (B, C and D zones). The upper aquifer zone extends from the water table at about 100 feet bgs to 124 feet bgs, where it is divided from the lower aquifer by an approximately 6-foot thick silty clay/clayey silt unit that varies in thickness across the site. Being significantly less permeable to groundwater flow, this unit acts as an aquitard between the upper and lower aquifers. It appears to be continuous across OU 1 and the majority of OU 2. The lower aquifer zone is semi-confined and extends from the base of the aquitard to the weathered shale bedrock at about 233 ft bgs.

Groundwater flow in the upper and lower aquifer zones is in an east-southeasterly direction based on water level measurements in monitoring wells distributed across the site. In the immediate area surrounding the former Dana Corporation property, the groundwater flow direction is variable since it is affected by both the operation of GET system and the presence of the ponds on the adjacent city-owned property and Great Plains Packaging property. The following discussion of hydraulic gradients and flow direction excludes groundwater directly beneath the former Dana Corporation property itself, OU 1, since this ROD only addresses OU 2. The hydraulic gradient ranges from 0.0015 to 0.0020 feet/foot. The groundwater flow direction at the site is consistent with the regional groundwater flow direction. It ranges between approximately 10° to 20° south of east for all three aquifer zones. A downward hydraulic gradient across the upper aquitard is consistently observed across the site during the summer growing season due to withdrawals by irrigation wells from the intermediate and lower aquifer zones. Outside of the growing season, the downward hydraulic gradient is smaller in magnitude, but generally still present.

Historical assessments on the availability of groundwater have indicated that aquifer transmissivity generally ranges from less than 50,000 gpd/ft in the northeastern corner and southernmost portions of Adams county to more than 200,000 gpd/ft in the central part of the county.

Hydraulic conductivity (*K*) at the site was characterized using hydraulic testing of disturbed subsurface soil samples. In the laboratory, constant head permeameter tests were conducted on 23 subsurface soil samples collected from the aquifer. Falling head permeameter tests were conducted on 6 subsurface soil samples collected from the aquitard and weathered bedrock. The results of the tests indicated that the hydraulic conductivity was heterogeneous in the thick aquifer and varied between 10 and almost 500 ft/day.

The *K* estimates at the site were supplemented with *K* estimates collected from the nearby Garvey site, located approximately ½-mile southwest of the site. A number of pumping tests have been performed at the Garvey site. Taking into account the close proximity and consistency of the aquifer across the area, as well as the aerial extent of both plumes, these *K* estimates were also considered representative. In general, the hydraulic conductivity of the D and E Zones of the lower aquifer was found to range from 188 to 301 ft/day. The variability of the estimated hydraulic conductivity values is primarily due to the heterogeneous nature of the alluvial sediments underlying the site and the differences in the scale of interrogation of the tests.

6.2 Known or Suspected Sources of Contamination

At the time the EPA initiated RI scoping activities in 2006 a number of field investigations had previously been performed by Dana Corporation, the NDEQ and the EPA. Dana Corporation conducted soil, soil gas, and groundwater investigations to identify other on-site source(s) associated with the PCE and 1,1,1-TCA contamination detected in groundwater at the site and to determine how extensive the PCE contamination was. The primary on-site source area for the PCE was confirmed to be the Phillips degreasing pit where there were multiple instances of the degreaser being overfilled, leading to spills into the concrete-lined pit. Other potential contaminant source areas were identified from past investigations and background research included other degreasing stations, chrome plating stations, exhaust stacks venting the chrome plating stations, process piping trenches and floor/storm drains.

The known or potential contaminant source areas are shown on Figure 2. The four degreasing units consisted of stainless steel tanks housed within subgrade concrete pits and are VOC contamination sources. The four chrome plating process stations, chrome strip pit, and chrome side plate pit are metals contamination sources. The exhaust stacks that vented the chrome plating areas are potential sources of metals contamination. The piping trenches, floor drains, and storm drains are potential VOC and metals contamination sources.

6.3 Nature and Extent of Contamination

RI field activities were conducted at the site to define the nature and extent of contamination in the sediment, surface soil, subsurface soil, sub-slab soil gas and groundwater at OU 1 and the groundwater at OU 2. The following provides a summary of the nature and extent of contamination of metals and VOC contamination in soil, soil gas, and groundwater at the site that exceeded established Federal or state limits, or in the event such limits have not been promulgated, that pose human health or ecological risks above acceptable limits. The nature and extent of contamination at OU 1 is only briefly described since this Interim ROD addresses contaminated groundwater at OU 2. Additional information on the nature and extent of contamination at OU 1 can be found in the 2011 *Revised Final Remedial Investigation Report.*

Field investigations at OU 1 focused on those areas where contaminants were known to have been or potentially could have been released. These areas included the known source area of the Phillips degreaser, as well as the locations of the other degreasers, the four chrome plating process pits, chrome strip pit, and chrome side plate pit. Field investigations of the OU 2 groundwater focused on groundwater in the area downgradient of the source area at OU 1. To the extent possible, subsurface soil, soil gas, and groundwater samples at OU 1 and OU 2 were collected using direct-push technology (DPT) techniques to effectively and efficiently characterize the site.

At OU 1, sediment samples were collected from five locations in the retention pond on the east side of OU 1 and analyzed for VOCs and metals. VOCs were not detected above screening levels. Of the three metals detected at levels exceeding screening levels (arsenic, chromium (VI), and iron), only chromium (VI) was identified as being above background and attributable to the site.

To evaluate the potential impact of air emissions from the discharge stacks for the plating ventilation system, surface soil samples were collected from locations around the exterior of the building where fallout of particulates was predicted as most likely to occur. Samples were analyzed for VOCs and metals. None of the metals were detected at levels significantly different than background and it was concluded that the impact of emissions from the chrome plating ventilation stacks was negligible.

Subsurface soil sampling was performed to assess VOCs near the former degreasing areas, and metals near the four chrome plating pits and side plating pit. Nineteen soil samples were collected at multiple depths and locations near the degreasers and analyzed for VOCs. Approximately 120 soil samples were collected at multiple depths and locations near the plating areas and analyzed for metals. VOCs that exceeded their respective screening levels were 1,4-dioxane, ethylbenzene, and PCE. The boring location adjacent to the southwest corner of the Phillips degreaser had the highest PCE concentrations, with one sample collected just below the water table containing 16,000,000 micrograms per kilogram (µg/kg). Several metals were found to exceed their respective screening levels, but almost all were later determined to be within naturally-occurring levels for the area (i.e., background). Only chromium (VI) and vanadium were identified as above background and at levels of concern.

Subsurface soil gas sampling was also performed to assess VOCs near the former degreasing areas. A total of 552 soil gas samples were collected at 26 locations at multiple depths from just beneath the subslab of the building to depths near the water table at 110 feet bgs. Shallow subslab soil gas sampling indicated 1,4-dioxane, benzene, ethylbenzene, PCE and TCE exceeded screening levels for possible vapor intrusion. Soil gas samples collected at depths below 10 feet bgs found benzene, TCE, and PCE above screening levels at only a few locations.

The upper and lower aquifer zones at OU 1 were characterized by collecting groundwater samples at more than 40 boring locations adjacent to and up-, cross-, and downgradient of the former degreasing pits. Beneath the building, samples were collected at the water table and the base of the upper aquifer; outside the building, samples were collected at 10-foot depth intervals to the base of the aquifer at about 220 feet. Sampling results indicated that 1,1,2-TCA and PCE exceeded their respective MCLs in the upper aquifer and that there are two sources of VOCs: the Phillips degreaser and the Northern degreasers. Sampling results from the lower aquifer indicate 1,1,2-trichloroethane (1,1,2-TCA), benzene, and PCE exceeded their respective MCLs.

Groundwater contamination at OU 2 was evaluated using a combination of DPT borings and monitoring well sampling. In 2008, more than 130 groundwater samples were collected from multiple depths at 16 DPT locations. The DPT locations were positioned along three transects oriented approximately perpendicular to the regional groundwater flow direction. The results from analysis of the samples were used to interpret the nature and extent of the groundwater contaminant plume and to determine the optimal locations to place monitoring wells for long-term water quality monitoring. Only PCE and carbon tetrachloride (CCl_4) were detected at concentrations that exceeded the MCLs for drinking water. The CCl_4 is associated with the contaminated groundwater plume from the Garvey site south of OU 2. The CCl_4 is not a site-related contaminant for Dana and was not found co-located with PCE at levels exceeding the MCLs. The highest concentrations of the PCE observed in OU 2 groundwater since the start of RI activities in 2007 was 180 µg/l at DPT location TS3-02.

The groundwater flow rate in the lower aquifer zone, where the majority of the contaminated groundwater plume exists, is estimated to range between approximately 0.25 and 2 feet per day

The upper half of Figures 4 and 5 illustrate the extent of the PCE plume in the upper aquifer zone and lower aquifer zone, respectively, as characterized by sampling conducted in 2008. Figure 6 illustrates the PCE plume in a vertical cross section along the A-A' cross-section line shown in Figure 4.

Since the in-depth characterization effort in 2008, the migration of the contaminant plume has been periodically monitored through sampling of the network of monitoring wells. The current distribution, as predicted by groundwater flow and transport modeling, is shown in the bottom half of Figure 3.

7. Current and Potential Future Land and Water Uses

The former Dana Corporation facility property, OU 1 of the site, is located in the HIPW. The former Dana Corporation facility is currently operated by Dutton-Lainson Company, a manufacturer of stock tanks and livestock feeders. The property is zoned I-2 heavy industrial, as is the entire HIPW. The site is bounded to the north, east, and south by other industrial facilities and to the west by railroad tracks and agricultural fields. The most recent comprehensive development plan (CDP) for the city of Hastings was adopted by the city Council and the Planning and Zoning Commission in January 2009, with the most recent updates to the property use plans in December 2016. The plan indicates the future use of the property itself and the current surrounding properties will remain industrial. In addition, the bounding property to the west is planned to be changed in the future from agricultural to industrial.

Land use in the areas above the OU 2 groundwater contaminant plume to the east of the HIPW is currently a combination of industrial, commercial, residential and agricultural. The nearest residential developments are about 0.25 and 0.5 miles to the north and southeast, respectively. The CDP indicates similar future use of the properties in the area.

Groundwater in the area is heavily utilized by the city of Hastings as a drinking water source and by others for industrial, commercial, agricultural (livestock and irrigation) and domestic uses. The nearest municipal well utilized for drinking water is Hastings Municipal Well No. 9, which is located about ½-mile northeast of the site. Other nearby municipal wells are Municipal Well Nos. 13 and 14, which are currently being operated for use in emergency only. The former Dana Corporation facility previously utilized a pair groundwater wells for their heat pump system. The heat pump system was disconnected in 2006 and the wells have been decommissioned. A total of 15 industrial, commercial and residential wells were identified as being within the contaminant plume. All wells have either been abandoned or are no longer accessed for potable uses.

The groundwater in the area of the site has been designated as a Class GA Ground Water Supply by the state of Nebraska. A Class GA Ground Water is a groundwater supply which is currently being used as a public drinking water supply or is proposed to be used as a public drinking water supply. Contamination detected at OU 1 caused the state to designate the site as a Remedial Action Class 1 (RAC-1), requiring the "most extensive remedial action measures" to clean up the groundwater to drinking water quality suitable for all beneficial uses.

8. Summary of Site Risks

Superfund requires the EPA to seek permanent solutions to protect human health and the environment from hazardous substances. These solutions provide for removal, treatment or containment of hazardous substances, pollutants and contaminants so any remaining contamination does not pose an unacceptable risk to human receptors, ecological receptors or the environment. A baseline human health risk assessment (HHRA) and screening level ecological risk assessment (SLERA) were performed to quantify the risks and/or hazards. The response action selected in this Interim Record of Decision is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

In 2016 and 2017, the HHRA was amended by an update of toxicity values and reassessment of potential exposures, as well as an assessment of naturally occurring background constituents. The reassessment of potential exposures also incorporated into the exposure calculations the EPA's revised default attenuation factor, which was revised from 0.1 to 0.03. The concentration of a volatile contaminant in the soil gas beneath a building is multiplied by the attenuation factor to obtain an estimate of the contaminant's concentration in the indoor air inside the building.

Since this Interim ROD addresses OU 2, this summary of the site risks as presented in the HHRA is limited to risks posed by the contaminated groundwater at OU 2. Information on the risks posed by contaminants at OU 1 can be found in the HHRA presented in the *Revised Final Remedial Investigation Report* (2011), as amended by the *Revised Human Health Risk Assessment Addendum* (2017).

8.1 Summary of Human Health Risk Assessment

An HHRA was conducted for the site as part of the RI/FS to estimate the risks and hazards to human receptors associated with current and future potential uses. The HHRA is an analysis of the potential adverse human health effects caused by exposure to the hazardous substances in the absence of any actions to control or mitigate the exposures.

A four-step process is used in the HHRA to assess the site-related cancer risks and noncancer health hazards. The four-step process: 1) identification of COPCs and calculation of exposure point concentrations (EPCs); 2) assessment of potential exposures; 3) assessment of toxicity of COPCs; and 4) calculation of the risk based on exposures, toxicity and concentrations of COPCs. At the end of the risk-assessment process, those COPCs found to pose an unacceptable human or ecological risk, called risk drivers, are identified as contaminants of concern (COCs).

The metal chromium exists in a variety of species, with +3 [chromium (III)] and +6 [chromium (VI)] being the most common oxidation states. Total chromium is the sum of chromium concentration across species. For a combination of statutory, technical and economic reasons, chemical analyses are typically performed for total chromium, and less commonly speciated for chromium (III) or chromium (VI). Chromium (VI) is the most hazardous and for that reason, the approach taken in the assessment of risk was to assume all chromium was in the chromium (VI) form. For groundwater, the following hierarchy was followed. When speciated results were available for a sample, chromium VI concentrations were used. Total chromium concentrations were used when speciated data were not available. When the total chromium results were used, it was assumed that all of the detected chromium was chromium VI.

In 2016 and 2017, the HHRA was supplemented by an update of toxicity values and reassessment of potential exposures, as well as an assessment of naturally occurring background constituents. To identify which COPCs were naturally occurring, and therefore not attributable to site activities, groundwater sampling results were statistically compared to the background concentrations characterized by sampling. For the OU 2 groundwater, the assessment identified several metals as being found at concentrations that were not significantly different from concentrations found in the background samples: arsenic, total chromium, hexavalent chromium, cobalt, iron, and manganese.

8.1.1 Media and Contaminants of Concern

The HHRA began with identifying COPCs in the OU 2 groundwater that could potentially cause adverse health effects in exposed populations. In this assessment, EPCs were estimated for each COPC using the statistical measure that was appropriate depending on the number of samples collected, the number of samples where contaminants were detected, and the distribution of concentrations among those detections. The EPC is intended to estimate a conservative exposure scenario that is still within the range of possible exposures. Chronic daily intakes were calculated based on the EPC, which is the highest reasonably anticipated to occur at the site. COPCs were then identified through comparison of the EPCs to risk-based screening levels.

Table 2 lists the COPCs for exposure scenarios in which the EPCs exceeded their respective screening levels. It is important to note that the COPCs presented here includes the metal chromium and the metalloid arsenic. The concentrations in samples collected on the site were statistically compared to the concentrations in samples collected at background locations. For both, the concentrations at the site were not statistically higher than background. In the last step of the HHRA process, which is the calculation of risk, arsenic and chromium are identified and their contribution to estimated risk is excluded.

8.1.2 *Exposure Assessment*

The purpose of the exposure assessment is to estimate the way a receptor could be exposed to chemicals at the site; quantify potential receptor characteristics such as location, the presence of sensitive sub-populations, and the activity patterns of current and future receptors; and the duration of the exposure. These are then used to quantify the exposure. The intensity of the exposure is dependent on the receptor characteristics of the receptor and the concentrations of the chemicals. The CSM identified potential receptors based on a simple particle tracking process linking contaminant sources to potential receptors though environmental transport and fate mechanisms (Figure 7). The CSM serves to identify the types of potential receptors and potential routes of exposure under current and plausible future conditions. Exposure assessment involves projecting concentrations along potential pathways between sources and receptors. The projection is accomplished using site-specific data, and, when necessary, modeling.

Pathways that are potentially complete are identified on the CSM (Figure 7). In addition to an adult receptor, which was assumed for all pathways, an adolescent, age-adjusted and/or child receptor were also considered for certain pathways. The only potentially contaminated media associated with OU 2 of the site is groundwater.

The land use scenario included the following potential exposure pathways for the current off-property resident: ingestion, dermal adsorption and inhalation of VOCs from domestic use of groundwater.

8.1.3 *Toxicity Assessment*

Toxicity assessment identifies the types of potential adverse health effects (such as cancer or birth defects) associated with exposure to a contaminant and the relationship between the adverse health effects and the exposure level. Human health risk assessments typically characterize potential noncancer health and cancer health effects separately. They are evaluated separately because for noncancer health effects it is assumed there is a level, or threshold, which will not result in adverse health effects, while for cancer effects it is typically assumed that exposure to any level will increase the risk or probability of developing cancer (i.e., no threshold exists).

For the oral and dermal routes of exposure, toxicity values for carcinogens, also known as cancer slope factors (CSF), are expressed in units of cancer incidence per unit dose of chemical. For the inhalation route of exposure, cancer risk is assessed with inhalation unit risk (IUR) values. IUR is the upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 µg/m3 in air.

For non-carcinogens, the toxicity values or reference doses (RfD) are expressed in terms of a threshold value below which adverse effects are not expected to be observed. Non-cancer risk is assessed using reference concentrations (RfC). An RfC is an estimate of a continuous inhalation exposure to the human population that is likely to be without an appreciable risk of deleterious effects during a lifetime.

There are five standard descriptors used to describe a chemical carcinogenic hazard potential based on a weight of evidence analysis. They are as follows: "Carcinogenic to Humans," "Probable Human Carcinogen," "Possible Human Carcinogen," "Not Classifiable as to Human Carcinogenicity," and "Likely to be Carcinogenic to Humans." Tetrachloroethylene is classified as "Likely to be Carcinogenic to Humans."

Toxicity values were obtained from the following hierarchy of sources in accordance with the EPA's Office of Solid Waste and Emergency Response Directive 9285.7-53.:

- Tier 1 – EPA's Integrated Risk Information System
- Tier 2 – Provisional Peer-Reviewed Toxicity Values
- Tier 3 – Other peer-reviewed values including: Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels; California Environmental Protection Agency (Cal/EPA); and the EPA Health Effects Assessment Summary Tables values (HEAST).

Carcinogenic toxicity information which is relevant to the COCs, is provided in Table 3. Table 4 provides noncancer toxicity data for COCs. As was the case for the carcinogenic data, dermal RfDs were extrapolated from the oral RfDs after applying an appropriate adjustment factor.

8.1.4 Risk Characterization

This section summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of risks due to the presence of site contaminants. Exposures are evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, an incremental lifetime cancer risk (ILCR) of 1.0E-04 (or 10^{-4}) means a "one in 10,000 excess cancer risk," or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the exposure assessment. ILCR is calculated from the following equation:

$$ILCR = CDI \times CSF$$

where:

ILCR	=	a unitless probability (e.g., 2E-05) of an individual's risk of developing cancer
CDI	=	Chronic daily intake averaged over 70 years (mg/kg-day)
CSF	=	Cancer slope factor $(mg/kg\text{-}day)^{-1}$

Current Superfund regulations for acceptable exposures specify an upper value of cancer risk as between 1.0E-04 to 1.0E-06. The goal of protection is less than 1.0E-06 for cancer risk.

For noncarcinogens, the potential for a receptor to develop an adverse health effect is estimated by comparing the predicted level of exposure for a particular chemical (e.g., chronic daily intake) with the highest level of exposure that is considered protective (i.e., its RfD). The ratio of chronic daily intake (i.e., exposure) to RfD (i.e., toxicity) is termed the hazard quotient (HQ) and is calculated as follows:

$$HQ = CDI/RfD$$

where:

RfD	=	Reference dose (mg/kg-day)
CDI	=	Chronic daily intake (mg/kg-day)

CDI and RfD represent the same exposure period (i.e., chronic, subchronic or short term).

The Hazard Index (HI) is generated by adding the HQs for all COCs that affect the same organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI<1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. An HI>1 indicates that site-related exposures may present a risk to human health.

The calculated carcinogenic risk and noncarcinogenic risk for the off-property resident exposure scenario are presented in Tables 5 and 6, respectively. The calculated risks are compared to the EPA's target risk range of 1.0E-06 to 1.0E-04 for carcinogenic effects and an HI of 1 on a target organ basis for noncarcinogenic effects. Chemicals which either estimated to cause a cancer risk greater than 1.0E-04 or have an HI of 1 are typically those that will require remedial action at the site and are referred to as COCs.

Current Off-property Resident – The current off-property resident was evaluated for exposure to COPCs in groundwater. The total HI is greater than 1. On a target organ basis, the neurological HI exceeds 1 due to PCE. The total cancer risk for all COPCs is 1.8E-05, which is less that the EPA's threshold of 1.0E-04.

8.1.5 Uncertainty

Conducting a risk assessment requires making numerous assumptions, which introduces uncertainty in the risk and hazard estimates. The main uncertainties in the HHRA are associated with data quality, exposure estimation and toxicological data. Detailed discussion of the uncertainties for each step of the HHRA process are provided in the *Revised Final Remedial Investigation Report* (2011).

8.2 Summary of Screening-level Ecological Risk Assessment

A Screening-level Ecological Risk Assessment was developed to analyze the potential effects of site contaminants on plants, soil invertebrates, mammals, and birds. The contaminant groundwater plume that constitutes OU 2 extends eastward from the site for approximately 2 miles. Above the aerial extent of the plume lies a potential wetland area, as identified by the Nebraska Department of Natural Resources (NDNR) and as shown on the National Wetland Inventory maps. Furthermore, it is not plausible that the contaminated groundwater from the site would discharge to this wetland because the surface of the groundwater is 120 feet below grade. Indeed, due to the depth to groundwater, no surface water discharge pathway has been identified for the plume. The conceptual site model is provided as Figure 8.

8.3 Summary of Risks

The interim remedy selected in this Interim ROD for OU 2 of the site is warranted to protect public health and welfare from actual or threatened releases of hazardous substances to the groundwater that may present an imminent and substantial endangerment to public health or welfare. With respect to OU 2, the HHRA prepared by the EPA in April 2011 as amended in 2016 and 2017, determined the following:

OU 2

- Unacceptable non-carcinogenic risk to future residents from exposure to groundwater used for domestic purposes. PCE was the major contributor.

Based on the results of the HHRA, as amended, the COCs in the different media at the site are summarized in Table 7.

9. Remedial Action Objectives

Remedial Action Objectives (RAOs) have been developed for the site OU 2 for the protection of public health and the environment based on findings of the RI/FS. The RAOs for OU 2 are as follows:

- To prevent further migration of contaminated groundwater in excess of the MCLs from the OU 2 area.
- To prevent exposure of current and future residents to concentrations of contaminants at or above the MCLs in the groundwater beneath the OU 2 area through domestic use.
- To reduce the concentration of contaminants in groundwater in the OU 2 area to concentrations less than or equal to their respective MCLs so that the aquifer is restored to its beneficial use.

A summary of the cleanup levels for OU 2 groundwater for each COC is provided in Table 8 below.

The cleanup levels for PCE in OU 2 groundwater is the SDWA MCL of 5 μg/l. Under certain conditions, PCE can degrade to TCE, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride. The lack of the presence of these contaminants in the groundwater indicates this degradation is not significant. However, their presence might reasonably be anticipated. For this reason, cleanup levels for these contaminants are set at their respective MCLs: TCE (5 μg/l), cis-1,2-dichloroethylene (70 μg/l), trans-1,2-dichloroethylene (100 μg/l), and vinyl chloride (2 μg/l).

This remedy is termed an interim remedial action under CERCLA because it does not select the remedy for the soil and groundwater at OU 1. However, the selected remedy in this document is expected to achieve the RAOs in the OU 2 groundwater when combined with source control actions for the site OU 1 that prevent contaminated groundwater from migrating outside of OU 1. The source control actions at the site OU 1 groundwater, currently being conducted by the EPA's Removal Program, have been evaluated as being effective in preventing migration of contamination groundwater.

10. Description of Remedial Alternatives to Address OU 2 Contaminated Groundwater

The development of alternatives to meet the RAOs followed the requirements identified in CERCLA and is not inconsistent with the NCP. The development of remedial alternatives was guided by prior EPA experience at VOC-contaminated sites. Reflecting the scope and purpose of these remedial actions, six remedial alternatives were evaluated to address contaminated groundwater in OU 2. Three remedial alternatives, the first involving monitored natural attenuation and the second and third involving in situ treatment, were screened out during the alternatives screening process, as described in the FS. The three remedial alternatives remaining were fully developed and are presented below. The remedial alternatives are numbered to correspond with their numbers in the FS report. The common elements of the remedial alternatives are described. For each remedial alternative presented, certain distinguishing features are discussed as well as the expected outcome at the conclusion of remedial actions.

The three remedial alternatives for OU 2 contaminated groundwater share two common elements:

- Monitoring of an existing Institutional Control (IC) on areas within or near the contaminated groundwater plume. This IC is an ordinance enacted and enforced by the city of Hastings that defines the Hastings Institutional Control Area (HICA) and contains certain restrictions and requirements on well installations with the HICA. The OU 2 groundwater lies within the bounds of the HICA. The IC protects human health and the environment by placing restrictions on water wells which would be a conduit for exposures to the contaminated groundwater. The ICs will be monitored to ensure it remains in place throughout the remedial action on OU 2 contaminated groundwater until RAOs are achieved.

- Five-year reviews, which will be performed every five years to ensure protection of human health and the environment until contaminants are reduced to levels that allow for unlimited use and unrestricted exposure, as required by CERCLA.

The present value of each alternative provides the basis for the cost comparison. The present value cost represents the amount of money that, if invested in the initial year of the RA at a given rate, would provide the funds required to make future payments to cover all costs associated with the RA over its planned life. Future operation and maintenance (O&M) and periodic costs are included and reduced by a present value discount rate of 7 percent.

10.1 Alternative G1: No Action

Estimated Time Frame:	*30 years*
Estimated Capital Cost:	*$92,000*
Estimated O&M Cost:	*$186,000*
Estimated Periodic Cost:	*$372,000*
Estimated Present Value:	*$214,000*

The NCP requires that the EPA consider a "no-action" alternative against which other remedial alternatives can be compared. Under this alternative, there would be no action to address the OU 2 groundwater contamination. The contaminated groundwater would continue to migrate and spread in the direction of groundwater flow and impact previously uncontaminated areas. Periodic groundwater monitoring and reporting would be conducted every five years in support of the mandatory five-year reviews. This alternative does include monitoring of the existing ICs. Typically, ICs are excluded from "no action" alternatives and instead included in a "limited action" alternative. However, it is considered appropriate to include them in this "no action" alternative because the IC is already in place. The estimated time frame is set at 30 years for purposes of allowing comparison with other alternatives, and is not meant to indicate groundwater would be restored over that period.

10.2 Alternative G3: Groundwater Recovery, Treatment, and Discharge at Leading Edge of Plume

Estimated Time Frame:	*30 years*
Estimated Capital Cost:	*$4,470,000*
Estimated O&M Cost:	*$9,938,000*
Estimated Periodic Cost:	*$538,000*
Estimated Present Value:	*$9,017,000*

This alternative would involve the installation and operation of a network of groundwater extraction wells near the leading edge of the plume to extract groundwater for treatment and to hydraulically contain the plume. A limited pre-design investigation would be conducted using DPT to update the plume. Monitoring wells would be installed for long-term monitoring purposes and to evaluate the effectiveness of the remedy.

Extracted groundwater would be pumped through an approximately 1.5-mile pipeline to a treatment building where it would be treated by air stripping to achieve the MCLs. It would then be reinjected into the aquifer using a network of injection wells, which would be located cross-gradient or downgradient of the plume. The number of extraction wells, their approximate locations, and their groundwater extraction rates have been estimated by a groundwater model. It is currently estimated that four extraction wells pumping at a rate of 200 gallons per minute (gpm) each would be needed to hydraulically contain and capture the contaminant plume.

Implementation of this alternative would require land acquisitions or easements for the wells and piping. The process of air stripping transfers the dissolved phase VOCs to the atmosphere. Emissions of VOCs to the atmosphere are projected to be well below acceptable federal and state requirements, so it is assumed that control technology for air emissions would not be necessary.

To save costs and minimize impacts to private property owners, this alternative would utilize space within the Garvey OU 2 GET building, that is planned to be constructed in a nearby location. An air striper would be installed, operated and maintained to treat the extracted groundwater from the site. The Interim Record of Decision issued in September 2013 for the Garvey site included construction of the Garvey OU 2 GET building as part of the remedial action to treat the Garvey CCl_4 groundwater plume. The Garvey OU 2 GET building has been designed and is planned to be constructed in the near future.

Groundwater modeling estimates the remediation time for this alternative is 30 years, assuming that the OU 1 removal activities would continue to contain and/or treat on-property source contamination and prevent it from migrating off the site to OU 2. It is assumed that groundwater monitoring would be conducted at the site quarterly for the first year, semiannually for 4 years, and annually for 25 years.

During remedial actions, this alternative would provide protection of human health through ICs to restrict access to VOC-contaminated groundwater. At the conclusion of remedial actions the groundwater would be at or below the cleanup levels and available for unrestricted and unlimited use.

10.3 Alternative G4: Groundwater Recovery, Treatment and Discharge at Mid-plume and Leading Edge of Plume

Estimated Time Frame:	*16 years*
Estimated Capital Cost:	*$8,042,000*
Estimated O&M Cost:	*$7,870,000*
Estimated Periodic Cost:	*$316,000*
Estimated Present Value:	*$12,757,000*

This alternative would involve the installation and operation of a network of extraction wells near the leading edge of the plume and in mid-plume areas. The leading-edge wells would extract groundwater for treatment and hydraulically contain the plume. The mid-plume extraction wells would extract groundwater for treatment. The combination of extraction wells at the leading edge and mid-plume areas is estimated to reduce the timeframe for aquifer restoration. A limited pre-design investigation would be conducted using DPT to update the plume. Monitoring wells would be installed for long-term monitoring purposes and to evaluate the effectiveness of the remedy.

Similar to Alternative G3, extracted groundwater would be pumped through approximately 2.5-miles of pipelines to the Garvey OU 2 GET building, that is planned to be constructed in a nearby location. An air stripper would be installed in the Garvey OU 2 GET building, and operated and maintained to treat the extracted groundwater from the site. The Interim Record of Decision issued in September 2013 for the Garvey site included construction of the Garvey OU 2 GET building as part of the remedial action to treat the Garvey CCl_4 groundwater plume. The water would be treated to achieve the MCLs then reinjected into the aquifer via a network of injection wells, which would be located cross-gradient or downgradient of the plume. The number of extraction wells, their approximate locations, and their groundwater extraction rates have been estimated by a groundwater model. It is currently estimated that three recovery wells pumping at a rate of 200 gpm each would be needed to hydraulically contain and capture the contaminant plume at the leading edge, and six extraction wells pumping between 150 and 200 gpm would be needed in the mid-plume area.

Implementation of this alternative would require land acquisitions or easements for the wells and piping. The process of air stripping transfers the dissolved phase VOCs to the atmosphere. Emissions of VOCs to the atmosphere are projected to be well below acceptable federal and state requirements, so it is assumed that control technology for air emissions would not be necessary.

During remedial actions, this alternative would provide protection of human health through ICs to restrict access to VOC-contaminated groundwater. At the conclusion of remedial actions the groundwater would be at or below the cleanup levels and available for unrestricted and unlimited use.

11. Comparative Analysis of Alternatives

Section 300.430(e)(9) of the NCP requires that the EPA evaluate and compare the remedial cleanup alternatives based on the nine criteria listed below. The first two criteria, overall protection of human health and the environment, and compliance with applicable or relevant and appropriate requirements (ARARs), are threshold criteria that must be met for the Selected Remedy. The Selected Remedy must then represent the best balance of the following five primary balancing criteria: long-term effectiveness and permanence; reduction of toxicity, mobility or volume of contaminants through treatment; short-term effectiveness; implementability and cost. The final two criteria, state and community acceptance, are referred to as modifying criteria. Presented below is the comparative analysis according to each of the threshold, primary balancing and modifying criteria. This analysis recognizes the interim nature of the remedy. Refer to Table 9 below for additional details on the evaluation of alternatives. Table 10 provides a breakdown of capital, O&M, and period cost for the alternatives. Table 11 presents a summary of the comparative analysis using a qualitative ratings system to assess the degree to which each alternative satisfies the threshold and balancing criteria.

11.1 Overall Protection of Human Health and the Environment

This threshold criterion evaluates whether an alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced or controlled through institutional controls, engineering controls and/or treatment.

Alternative G1 would provide adequate protection of human health in the short term, through the existing IC (HICA requirements), but would not provide adequate protection of human health in the long term as contamination will continue to migrate outside the HICA. Alternatives G3 and G4 would provide adequate short-term protection of human health through existing IC (HICA requirements). Alternatives G3 and G4 would similarly provide adequate long-term protection of human health since both alternatives would provide hydraulic capture, control and treatment of contaminated groundwater, preventing downgradient migration to areas outside the HICA. Alternatives G3 and G4 would provide adequate long-term protection to all areas after remedial actions are complete and cleanup levels have been achieved.

Alternative G1 fails to meet the protection of the environment criterion because it allows continued migration of the OU 2 contaminant plume. Alternatives G3 and G4 are protective of the environment because they prevent further aquifer degradation to downgradient areas by migration of the OU 2 contaminant plume. Alternatives G3 and G4 eventually restore the aquifer to its beneficial use at the conclusion of remedial activities when cleanup levels are achieved.

Because Alternative G1 does not meet this threshold criteria, it is eliminated from consideration under the remaining eight criteria. However, cost estimates are included to establish a baseline for comparison to the other Alternatives.

11.2 Compliance with Applicable or Relevant and Appropriate Requirements

This threshold criterion addresses whether the alternative will comply with federal and state environmental statutes, regulations and other requirements that pertain to the site or whether a waiver is justified. Section 121(d) of CERCLA and NCP § 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria and limitations which are collectively referred to as "ARARs", unless such ARARs are waived under CERCLA section 121(d)(4). "Applicable requirements" are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable. "Relevant and appropriate requirements" are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

In accordance with the NCP 40 CFR 300.430(f)(1)(ii)(C)(1), an alternative that does not meet ARARs can be selected if the alternative is an interim measure that will become part of a total or site-wide remedial action, which will attain ARARs.

Alternatives G3-G4 would meet chemical-specific ARARs including the Nebraska Title 118 groundwater quality standards. Alternatives G3 and G4 would have location specific ARARs associated with the construction of recovery, injection and monitoring wells, that can be met. Alternatives G3 and G4 would meet action-specific ARARs including Nebraska Title 122 underground injection control.

11.3 Long-term Effectiveness and Permanence

This criterion evaluates expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup levels have been met. This criterion includes the consideration of residual risk that will remain on-site following remediation and the adequacy and reliability of controls.

Alternatives G3 and G4 would both be effective in the long-term by reducing contaminant concentrations in groundwater to levels less than the MCLs, with a similar degree of certainty. Unrestricted groundwater use would be restored.

11.4 Reduction of Toxicity, Mobility and Volume

This criterion evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants; the degree of expected reduction in toxicity, mobility or volume; the type and quantity of treatment residuals; the degree to which the treatment will be irreversible; and the amount of residuals.

Alternatives G3 and G4 satisfy all the requirements of this criterion equally well. Both apply technologies that remove approximately the same contaminant mass, employ irreversible treatment and leave residuals at concentrations below levels of concern.

11.5 Short-term Effectiveness

This criterion evaluates the short-term risks that might be posed to the community, to workers and to the environment during construction and operation of the alternative as well as the time until the remedial action objectives are achieved.

Although the amount of construction for Alternatives G3 and G4 may differ, as with any construction project, there is similar risk to workers due to the construction of monitoring, extraction, and injection wells; buried piping runs; etc. However, Alternative G4 is rated higher because the estimated time to reach RAOs (16 years) is approximately half that of G3 (30 years).

11.6 Implementability

This criterion evaluates the technical and administrative feasibility of the alternatives from design through construction and operation. Factors such as availability of services and materials, administrative feasibility and coordination with other governmental entities are also considered.

Alternative G3 was given a slightly higher rating than G4. Both alternatives involve installation of extraction, injection, and monitoring wells, which is straightforward and should involve few technical difficulties during construction. Administratively, the implementation of both alternatives involves entering into access or easement agreements with property owners and local governments to locate buildings, piping and wells. Alternative G4 involves greater effort than G3 due to the greater number of locations where equipment would be installed.

11.7 Cost

This criterion evaluates the estimated capital costs, O&M costs and present-value costs of each alternative. The present value cost represents the amount of money that, if invested in the initial year of the RA at a given rate, would provide the funds required to make future payments to cover all costs associated with the RA over its planned life.

Cost estimates are expected to be accurate within a range of +50 to -30 percent. A summary of estimated costs is provided in Table 10. The table includes the cleanup time frame, capital cost, total O&M cost incurred over the cleanup time frame, periodic costs (e.g., pump replacement, well rehabilitation, etc) and present value. The FS contains the detailed breakdown of the costs for each alternative presented as well as the assumptions used to develop cost figures. The cost for conducting the five-year reviews is included in the O&M category for each of the alternatives presented. The estimated present value of Alternatives G3 and G4 are $9,017,000 and $12,757,000, respectively.

11.8 State Acceptance

This criterion considers whether the state, based on its review of the information, concurs with, opposes or has no comment on the EPA's Preferred Alternative. The state of Nebraska's authority regarding acceptance has been delegated to the NDEQ.

In their August 21, 2017 letter, the NDEQ stated they did not support the EPA's Preferred Alternative G3 – Groundwater Recovery, Treatment and Discharge at Leading Edge of Plume that was presented in the EPA's Proposed Plan. The NDEQ stated they did not support the Alternative G3 because Alternative G4, which uses the same remedial technologies, has a shorter cleanup timeframe and less cost to the state.

11.9 Community Acceptance

This criterion considers whether the local community agrees with the EPA's analyses and Preferred Alternative. Comments received on the proposed plan are important indicators of community acceptance.

The public-comment period on the Proposed Plan for interim action remedy for OU 2 was August 15 through September 15, 2017. A public meeting was conducted on August 23, 2017, to explain the Proposed Plan and all of the alternatives presented in the FS. General questions about the contamination at the site were received and responded to during the public meeting. During the public meeting, no disagreement of the Preferred Alternative was expressed by individual members of the local community. The full text of the transcript of the public meeting is included in the AR.

12. Principal Threat Wastes

The NCP establishes an expectation that the EPA will use treatment to address the "principal threats" posed by a site whenever practicable [NCP § 300.430(a)(1)(iii)(A)]. The "principal threat" concept is applied to the characterization of source materials at this Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water or air, or acts as a source for direct exposure. Contaminated groundwater generally is not considered to be a source material; however, nonaqueous phase liquids (NAPLs) in groundwater may be viewed as source materials. Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile, which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment, should exposure occur. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied.

Wastes that generally constitute principal threats include but are not limited to the following:

Liquid source material – waste contained in drums, lagoons or tanks, free product in the subsurface (i.e., NAPLs) groundwater containing COCs.

Mobile source material – surface soil or subsurface soil containing high concentrations of COCs that are or potentially are mobile due to wind entrainment, volatilization (e.g., VOCs), surface runoff or subsurface transport.

Highly toxic source material – buried drummed nonliquid wastes, buried tanks containing nonliquid wastes or soils containing significant concentrations of highly toxic materials.

Wastes that generally will not constitute principal threats include but are not limited to the following:

Nonmobile contaminated source material of low to moderate toxicity – surface soil containing COCs that generally are relatively immobile in or near groundwater (i.e., nonliquid, low-volatility, low-leachability contaminants such as high molecular weight compounds) in the specific environmental setting.

Low-toxicity source material – soil and subsurface soil concentrations not greatly above reference dose levels or that present an excess cancer risk near the acceptable risk range were exposure to occur.

Although the contaminated groundwater in OU 2 poses risks to human health and the environment, it is not considered a principle threat as defined by the EPA guidance because the COC concentrations are observed to be well below the solubility limit and are not indicative of NAPL being present.

13. Selected Remedy

Based upon consideration of CERCLA requirements, the detailed analysis of alternatives and comments from the state of Nebraska and the public, the EPA has selected Alternative G4 to address OU 2 groundwater. The selection is of Alternative G4 is not consistent with the EPA's Preferred Alternative presented in the Proposed Plan, which was Alternative G3. The rationale for the Selected Remedy, Alternative G4, are discussed herein. A description, cost and expected outcomes of the Selected Remedy are also included.

13.1 Summary of the Rationale for the Selected Remedy

Based on the information currently available, the EPA believes that the Selected Remedy meets the two threshold criteria and provides the best balance of trade-offs among the other alternatives with respect to the balancing and modifying criteria.

The EPA's Selected Remedy for the OU 2 groundwater is Alternative G4 - groundwater extraction, treatment and reinjection, with groundwater extraction from wells installed near the leading edge of the groundwater contaminant plume and in the mid-plume areas. The EPA's comparative analysis of the alternatives indicated that both Alternatives G3 and G4 satisfied the balancing criteria equally well, with the exception of present value cost. Present value cost for Alternative G4 was 40% more than Alternative G3. However, state acceptance is a modifying factor in the selection of the remedy. Taking into consideration the state's key concerns related to the state's cost share and the cleanup timeframe, the EPA has determined selection of Alternative G4 is warranted. Both alternatives employ the same treatment technology. The other primary considerations that affected the selection of the remedy over the other alternatives were as follows:

- The remedy will achieve reductions in the risk to human health and the environment in a reasonable timeframe. The remedy will, to the same degree or better than the other alternatives, prevent the continued spreading of contaminants in the aquifer and the resulting aquifer degradation.

- The Selected Remedy provides permanent and significant reduction in the toxicity, mobility and volume of COCs in the groundwater at OU 2 by transferring contaminant mass from the groundwater to the atmosphere through treatment.

- The Selected Remedy utilizes a proven technology that is technically and administratively feasible to implement.

- The remedy has a cleanup time frame equal to or shorter than the other alternatives.

The EPA expects the Selected Remedy to satisfy the following statutory requirements of CERCLA section 121(b): (1) be protective of human health and the environment, (2) comply with ARARs, (3) be cost effective, (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and (5) satisfy the preference for treatment as a principal element. Unacceptable short-term or cross-media impacts are not expected to occur.

13.2 Description of the Selected Remedy

The EPA's Selected Remedy for OU 2 is a groundwater recovery and treatment system with an estimated nine extraction wells distributed at the leading edge and mid-plume areas, along with monitoring of the existing IC restricting domestic use of groundwater in the HICA. Recovery wells at mid-plume locations will provide for additional treatment and hydraulic control. Mid-plume recovery wells will target areas of the plume with PCE concentrations greater than 5 μg/L in the medial aquifer, generally between South Elm Avenue and Showboat Boulevard. The leading-edge recovery wells will extract groundwater at a rate sufficient to capture groundwater contaminated above cleanup levels. Groundwater extracted by the recovery wells will be treated by air stripping. The treated groundwater will be reinjected into the aquifer or made available for beneficial reuse. The number of recovery wells, their approximate locations and groundwater extraction rates, have been estimated based on a groundwater flow and transport model and are illustrated on Figure 9.

The principal components of the interim remedy for the OU 2 groundwater are as follows:

- Installation of an estimated nine recovery wells;
- Construction of an air stripping system treatment system within the Garvey site treatment system building, which was previously designed and is planned for construction;
- Construction of an estimated six injection wells to reinjected treated effluent;
- Construction of pipelines for the transmission of extracted groundwater from the extraction wells to the treatment building, as well as for the transmission of treated effluent from the treatment building to the injection wells;
- Construction of an estimated two recovery well control buildings;
- Construction of a network of an estimated 20 monitoring wells for performance monitoring of the remedy;
- Quarterly, semiannual and annual groundwater monitoring;
- System operation and monitoring;
- Periodic well maintenance and equipment replacement.
- Monitoring the city of Hastings IC on the areas within or in close proximity to the contaminated groundwater plume.

The descriptions of the Selected Remedy are based on information currently available. Details such as the exact number and locations of recovery wells, rates of groundwater extraction from recovery wells and layout of piping from wells to the treatment system, as well as other details, will be determined during the Remedial Design (RD) based on achieving the RAOs. The Selected Remedy will require land acquisitions or easements, for the wells and piping at the leading edge of the plume and mid-plume areas. The estimated time to reach cleanup levels in the OU 2 groundwater for this alternative is 16 years. The process of air stripping transfers the dissolved phase VOCs to the atmosphere. Emissions of VOCs to the atmosphere have been are projected to be well below acceptable federal and state requirements, so it is assumed that control technology for air emissions would not be necessary.

The RAOs and cleanup levels for this interim RA were previously outlined in section 9. Performance objectives that will be used to monitor progress towards achieving the RAOs and cleanup levels will be established during the RD.

13.3 Cost Estimate for the Selected Remedy

<u>OU 2</u>
Estimated Time frame: 16 years
Estimated Capital Cost: $8,042,000
Estimated O&M Cost: $7,870,000
Estimated Periodic Cost: $316,000
Estimated Present Value: $12,757,000

Summaries of the estimated capital, O&M, and periodic costs of the major components of the Selected Remedy for OU 2 are included in Tables 12. Table13 provides a summary of the present value analysis. The present value analysis provides an annualized breakdown of capital, annual and periodic costs. More details on the development of the cost estimates can be found in Appendix G of the FS. The information in these cost-estimate summary tables and present value analyses are based on the best available information regarding the anticipated scope of the remedial alternatives. These are order-of-magnitude engineering cost estimates that are expected to be within +50 to -30 percent of the actual project cost. In addition, changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternatives. Major changes, if any, may be documented in the form of a memorandum in the AR, an explanation of significant difference or a ROD amendment.

13.4 Estimated Outcomes of the Selected Remedy

This interim remedy for the site will capture contaminated groundwater from OU 2 and prevent its downgradient migration and reduce concentrations of contaminants in OU 2 groundwater below the MCLs, thereby reducing the risk to human health and the environment.

The cleanup levels were provided in Table 8 of Section 9 of this Interim ROD. The cleanup levels for OU 2 groundwater were established on the basis of federal and state ARARs.

For OU 2, upon achievement of the cleanup levels, the unacceptable risk to current resident from exposure to contaminated groundwater should be eliminated.

14. Statutory Determinations

Under CERCLA section 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume toxicity or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. This preference is addressed in the Selected Remedy. The following sections discuss how the Selected Remedy meets these statutory requirements.

14.1 Protection of human health and the environment

The Selected Remedy, Alternatives G4, will protect human health and the environment at OU 2 by pumping and treating contaminated groundwater and through monitoring of the existing institutional control. The groundwater pump and treat system will prevent further plume migration to unimpacted areas and will remove PCE and its potential degradation compounds to levels that meet Federal drinking water standards.

The existing IC established, implemented and monitored by the city of Hastings will continue to prevent the exposure of current/future residents to PCE and its potential degradation compounds via domestic use of private well water. The current carcinogenic cancer risk associated with this pathway is 1.8 x 10^{-5} and the noncarcinogenic risk is 3. The Selected Remedy will reduce the carcinogenic risk from exposure to less than or equal to 1.0E-06 and reduce the noncarcinogenic risk from exposure to less than 1.0. There are no short-term threats associated with the Selected Remedy that cannot be readily controlled. In addition, no adverse cross-media impacts are expected from the Selected Remedy.

14.2 Compliance with ARARs

Section 121(d)(2) of CERCLA; 42 U.S.C. 9621(d)(2); NCP, 40 CFR part 300; and guidance and policy issued by the EPA require that remedial actions conducted under CERCLA achieve a degree or level of cleanup which, at a minimum, attains any standard, requirement, criteria or limitation under any federal environmental law...or any promulgated standard, requirement, criteria or limitation under a state environmental or facility siting law that is more stringent than any federal standard "...[which] is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened release of such hazardous substance or pollutant or contaminant..." The identified standards, requirements, criteria or limitations thus adopted from other environmental laws, which govern on-site cleanup activities at this site, are referred to as applicable or relevant and appropriate requirements or ARARs.

For on-site cleanup activities under section 121(e)(1) of CERCLA, the EPA is not required to obtain any federal, state, or local permits. For actions conducted on-site, the Selected Remedy will comply with the substantive (non-administrative) requirements of the identified federal and state laws. However, for cleanup activities that will occur off-site, both the substantive as well as the administrative requirements of such laws will apply to cleanup activities. This section identifies the ARARs which will apply to the on-site cleanup activities.

CERCLA section 121(d)(4) authorizes that any ARAR may be waived under one of six conditions. One of these conditions is when the remedial action selected is only part of a total remedial action, and the total remedial action will attain such level or standard of control when completed. This Interim ROD describes the interim RA that will address groundwater at OU 2. This Interim Action will be consistent with the final remedy.

Appendix A presents a summary of federal and state ARARs. The Selected Remedy for OU 2 groundwater will comply with the ARARs in Appendix A. Several of the more significant ARARs for the Selected Remedy are as follows:

- ***Safe Drinking Water Act, 42 U.S.C. 300(f), et seq., National Primary and Secondary Drinking Water Regulations, 40 CFR parts 141 and 142:*** The National Primary and Secondary Drinking Water Regulations (40 CFR Parts 141 and 143) establish MCLs for chemicals in drinking water distributed in public water systems. These are enforceable in Nebraska under NRS § 81-1505(1)(2), et seq., § 71-5301 to 71-5313 (SDWA), NDHHS Title 179, and NDEQ Title 118, Chapter 4. MCLs for the COCs are relevant and appropriate for establishing cleanup standards for remedial actions.

- ***Nebraska Ground Water Quality Standards and Use Classification, Title 118:*** The narrative and numerical requirements of Title 118 are relevant and appropriate to the groundwater at the site. It is likely that any discharge limits would be based on groundwater quality standards because of the conjunctive relationship of groundwater and surface water. Under Title 118, a RAC of "1" is assigned automatically any time a public or private drinking water supply has been contaminated. Minimum requirements imposed upon the responsible party in a RAC-1 area include the cleanup of readily removable contaminants. Mitigation may also be required. If additional cleanup is not required, the remaining contaminated groundwater will be managed and monitored to prevent any further damage. Preliminary cleanup levels in RAC-1 areas are typically MCLs. If an MCL has not been established for a particular contaminant, the Department can consider the EPA's Ambient Water Quality Criteria, Health Advisories, and other documents in setting the preliminary cleanup level. The level will be set at the concentration which is estimated to result in a 1×10^{-6} excess cancer risk or the laboratory detection limit, if higher and within an acceptable range. The timeframe for any required corrective action is established, subject to appeal with adequate justification, as the period of potential exposure in the absence of any remedial action or 20 years, whichever timeframe is less

- ***State of Nebraska Solid Waste Requirements, Titles 128 and 132:*** These regulations set forth standards that apply to a person involved in any aspect of the management of solid or hazardous waste. If a solid waste is generated during implementation of the remedial action (e.g., spent carbon) a hazardous waste determination must be made pursuant to Title 128, Chapter 4, 002. If material is a hazardous waste, it must be handled and disposed of in accordance with the hazardous waste management requirements in Chapters 8 – 11. If the material is not a hazardous waste, it may be a special waste as defined in Title 132, Chapter 1, and the generator must follow the requirements of the NDEQ Title 132, Chapter 13, and may only be disposed of at a permitted landfill which is operated and maintained in compliance with the NDEQ regulations, unless an alternate location and management method is approved.

- ***State of Nebraska Groundwater Well and Monitoring Requirements:*** Pursuant to Title 456, groundwater monitoring wells must be registered with the Nebraska Department of Natural Resources. Water Well Standards and Contractor's Licensing regulations are found at Neb. Rev. Stat. 46-1201 to 46-1241 and accompanying regulations at Title 178. Well Spacing requirements are found at Neb. Rev. Stat. 46-651 to 46-655.

- ***State of Nebraska Rules and Regulations for Underground Injection and Mineral Production Wells, Title 122:*** The selected interim RA includes the reinjection of treated groundwater to the aquifer. Infiltration and/or reinjection of groundwater and injection of substances or nutrients would require a UIC permit or review under Title 122 or review of plans and specifications under Title 123. Underground injection may also require an NPDES permit under Titles 119 and 121 based on the potential impact to groundwater. However, the EPA would only be required to meet the substantive requirements of the UIC and NPDES permits.

14.3 Cost Effectiveness

The EPA has determined that the Selected Remedy is cost effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." [NCP § 300.430 (f)(1)(ii)(D)]. This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost effectiveness.

The Selected Remedy meets the criteria and provides for overall effectiveness in proportion to its costs. The estimated present value of the Selected Remedy is $12,757,000. Although Alternative 3 is $3,740,000 less expensive, the time to cleanup timeframe (time to achieve RAOs) is 30 years, compared to 16 years for the Selected Remedy, and therefore the remedy is cost-effective. Changes in the cost elements are likely to occur as a result of new information and data collected during the implementation of the remedial alternative. Major changes may be documented in the form of a memorandum in the AR, an explanation of significant differences, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project costs.

14.4 Utilization of Permanent Solutions and Innovative Treatment Technologies to the Maximum Extent Practicable

The EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at OU 2. Of those alternatives that are protective of human health and the environment and comply with ARARs, the EPA has determined that the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria given the scope of this action while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal and considering state and community acceptance.

The Selected Remedy satisfies the criteria for long-term effectiveness by removing PCE contamination from the groundwater. The Selected Remedy does not present short-term risks different from other treatment alternatives. There are two implementability issues that set the Selected Remedy apart from the other alternatives evaluated:

1. The presence of a large wetland area above a portion of the contaminated groundwater plume. If it is determined during the design phase that constructed features will be necessary within the wetland, this is expected to increase the administrative requirements.

2. The need for access to a greater number of locations for extraction wells and piping. The EPA will necessarily have to enter into a greater number of access or easement agreements with property owners and local governments.

Therefore, The Selected Remedy, Alternative G4, involves greater effort than Alternative G3 due to the greater number of locations where equipment would be installed.

14.5 Preference for Treatment as a Principal Element

By treating the extracted groundwater by air stripping to remove COCs, the Selected Remedy addresses principal threats posed by the site through the use of treatment technologies. By utilizing treatment as a significant portion of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied.

14.6 Five-year Review Requirement

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment. This statutory review will be conducted within five years after the initiation of the remedial actions.

15. Documentation of Significant Changes

The Proposed Plan for the site was released for public comment August 15, 2017. The Proposed Plan identified the Preferred Alternative as G3 – Groundwater Recovery, Treatment and Discharge at Leading Edge of Plume. The EPA did not receive written or verbal comments from the public or local government during the public comment period. The EPA did receive a letter from the NDEQ stating they did not concur with the EPA's Preferred Alternative. The letter cited two factors: the longer 30-year timeframe of Alternative G3 compared to the 16-year timeframe of Alternative G4; and the higher costs to the state during the O&M Period that begins ten years after a constructed remedy is declared Operational and Functional and continues until RAOs are achieved. The NDEQ stated these costs would be $3,627,000 more for Alternative G3 than for Alternative G4. It is noted that the NDEQ's assessment of the difference in costs over the O&M Period used non-discounted future costs (i.e. costs to be incurred in the future that are not discounted to a present value). Applying the concept of present value, in accordance with NCP 300.430 (e)(9)(iii)(G)(*3*), the state costs over the O&M Period would only be $519,000 higher for Alternative G3 than for Alternative G4.

The comparative analysis of Alternatives G3 and G4 presented in the Proposed Plan determined that with the exception of the present value cost, the Alternatives satisfied the balancing criteria equally well. However, taking into consideration the state's key concerns (obtained during the public comment period) regarding the state's cost share and the cleanup timeframe, the EPA has determined selection of Alternative G4, instead of Alternative G3, is warranted. Both alternatives employ the same treatment technology, however, the cost of operating and maintaining the G4 Alternative (borne by the state) is less burdensome on the state, and the G4 alternative has a shorter clean up time frame. Both alternatives G3 and G4 were presented in detail in the proposed plan which was subject to public review and comment. While G3 was presented in the proposed plan as the EPA's "preferred alternative," the purpose of the public comment period is for the EPA to ascertain the considerations and preferences of the community and state. In this instance, the state strongly preferred Alternative G4. Based on the discussion above, the EPA believes that this is a change that could have been reasonably anticipated by the public and considers the statutory requirements - ensuring that the public has the opportunity to comment on major remedy selection decisions – to have been met by the original public comment period that began August 15, 2017 and the remedy selected comports with the public comment received.

PART III: RESPONSIVENESS SUMMARY

This responsiveness summary has been prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This document provides the response from the U.S. Environmental Protection Agency (EPA) to all significant comments received regarding the Proposed Plan from the public during the public-comment period.

On August 15, 2017, the EPA released the Proposed Plan and the AR, which contains the documents considered or relied upon by the EPA with regard to response actions at OU 2 of site. The Proposed Plan discussed the EPA's proposed actions to prevent human exposures to contaminated groundwater in and near the OU 2 contaminated groundwater plume, prevent further migration of the OU 2 plume, and restore the aquifer to its beneficial use. The public-comment period on the Proposed Plan was from August 15 to September 15, 2017.

On August 23, 2017, the EPA held a public meeting in the Hall Student Union, Central Community College, 550 South Technical Boulevard, Hastings, NE, 68901. The Proposed Plan for OU 2 was presented at the public meeting and a court reporter recorded the proceedings of the meeting. Copies of the transcript and attendance list are included in the AR. The public comment period and the public meeting were intended to elicit public comment on the Proposed Plan.

In general, individual members of the local community were concerned and had questions about the site but did not express an opinion regarding the EPA's Preferred Alternative. During the public meeting, no disagreement with the Preferred Alternative was expressed by individual members of the local community. There was one local official in attendance at the public meeting: Mr Steve Halloran, Nebraska state Senator representing District 33.

The EPA received one letter in response to the EPA's Proposed Plan. The letter, from the Director of the NDEQ, is included in Appendix B. The letter stated that the NDEQ did not concur with the selection of Alternative G3 for two reasons: 1) it has a longer restoration timeframe (30 years) than Alternative G4 (16 years); and the O&M costs of Alternative G3 would be $3,627,000 greater than Alternative G4. The NDEQ did not explicitly state their preference for Alternative G4, although it was clearly implied in their rationale for rejecting Alternative G3.

The EPA took into carefully consideration, the NDEQ's concerns regarding the cleanup timeframe and state cost share and determined the selection of Alternative G4 would best satisfy the nine criteria in Section 300.430(e)(9) of the NCP. The EPA's response to the NDEQ is included in Appendix B.

ABBREVIATIONS

AR	administrative record
ARAR	applicable or relevant and appropriate requirement
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
Cal/EPA	California Environmental Protection Agency
CCl_4	carbon tetrachloride
CDI	chronic daily intake
CDP	comprehensive development plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
$CHCl_3$	chloroform
COC	contaminant of concern
COPC	contaminant of potential concern
CSF	cancer slope factor
CSM	conceptual site model
DPT	direct-push technology
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
FS	feasibility study
FR	Federal Register
Garvey site	Garvey Elevator Superfund site
GET	groundwater extraction and treatment
gpd/ft	gallons per day per foot
gpm	gallons per minute
HEAST	EPA health effects summary tables
HEGB	Hasting Equity Grain Bin
HHRA	baseline human health risk assessment
HIPW	Hastings Industrial Park-West
HI	hazard index
HICA	Hastings Institutional Control Area
HQ	hazard quotient
IC	institutional control
ILCR	incremental lifetime cancer risk
IUR	incremental unit risk
Interim ROD	Interim Record of Decision
JTSB	Joint Treatment System Building
K	hydraulic conductivity
MCL	maximum contaminant level under the Safe Drinking Water Act
N/A	not applicable
NAPL	nonaqueous phase liquid
NCP	National Oil and Hazardous Substances Contingency Plan
NDEQ	Nebraska Department of Environmental Quality
NDNR	Nebraska Department of Natural Resources
NPL	National Priorities List
O&M	operation and maintenance
OU	operable unit
PCE	tetrachloroethene
RA	remedial action

RAC	remedial action classification
RAO	remedial action objective
RAPMA	Remedial Action Plan Monitoring Act
RD	Remedial Design
RfC	reference concentration
RfD	reference dose
RI	remedial investigation
SDWA	Safe Drinking Water Act
Site	West Highway 6 & Highway 281 Superfund Site
SLERA	screening level ecological risk assessment
SVE	soil vapor extraction
1,1,1-TCA	1,1,1-trichloroethane
1,1,2-TCA	1,1,2-trichloroethane
TCE	trichloroethene
µg/kg	micrograms per kilogram
µg/l	micrograms per liter
VCP	voluntary cleanup program
VOC	volatile organic compound

GLOSSARY OF TERMS

This glossary defines many of the technical terms used in relation to the site in this Interim Action ROD for the interim RA. The terms and abbreviations contained in this glossary are often defined in the context of hazardous waste management and apply specifically to work performed under the Superfund program. Therefore, these terms may have other meanings when used in a different context.

Administrative Record: The body of documents the EPA uses to form the basis for selection of a response.

Applicable or Relevant and Appropriate Requirements: Federal and state requirements for cleanup, control, and environmental protection that a Selected Remedy for a site will meet.

Aquifer: A formation, or group of formations, that yields water to a well of sufficient quality and quantity for drinking and/or other purposes.

Aquitard: A layer within an aquifer that is composed of material less permeable than the aquifer located above and below it.

Capital Costs: Expenses related to the labor, equipment, and material costs of construction.

Carcinogenic Risk: Carcinogenic risks are probabilities usually expressed in scientific E notation (e.g., 1E-06). An excess carcinogenic risk of 1E-06 indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of a site-related exposure.

Cleanup Levels: Medium- and contaminant-specific goals set to achieve as a result of the RAOs (e.g., treatment of contaminated groundwater to MCLs).

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act. The acts created a special tax that went into a trust fund, commonly known as Superfund, to investigate and cleanup abandoned or uncontrolled hazardous waste sites. Under the program, the EPA can either: (1) pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work, or (2) take legal action to force parties responsible for site contamination to clean up the site or pay back the federal government the cost of the cleanup.

Contaminant of Concern: The chemical substances found at the site at concentrations that pose an unacceptable risk to human health and the environment.

Contaminant Plume or Plume: A three-dimensional volume of contaminated groundwater. The contaminant plume's size and shape are influenced by such factors as groundwater flow direction and rate, the type of contaminant, the properties of the aquifer, and rate of aquifer recharge from infiltration, among other factors.

Downgradient: Locations along the general path of groundwater flow in a direction away from the observer or reference point. It is analogous to the term downstream when referring to locations on a stream relative to an observer.

Feasibility Study: The report that presents the identification and evaluation of the most appropriate technical approaches to address contamination problems at a Superfund site.

Fund-financed: Activities financed by the Trust Fund. Refer to Comprehensive Environmental Response, Compensation, and Liability Act.

Fund-lead Removal Action: The EPA-lead cleanup activities, generally time sensitivity in nature, taken to abate, prevent minimize, stabilize, mitigate, or eliminate the threat to human health and the environment.

Groundwater Extraction and Treatment: A groundwater remediation technology that utilizes a combination of extraction wells and a treatment system(s) that treats the discharge from the extraction wells (commonly referred to as pump-and-treat).

Hazard Ranking Score: The principal mechanism the EPA uses to place uncontrolled waste sites on the NPL.

Interim Remedial Action: A remedy that is performed before the RI/FS for the site or operable unit has been completed and is performed to mitigate immediate threats.

Maximum Contaminant Level: Established by the Safe Drinking Water Act as the maximum permissible contaminant level in water that is delivered to any user of a public water system.

Maximum Contaminant Level Goal: The highest level of a contaminant in drinking water below which there are no known or expected risk to human health.

National Priorities List: The EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response.

Operable Unit: A distinct portion of a Superfund site or a distinct action at a Superfund site. An operable unit may be established based on a particular type of contamination, contaminated media (e.g., soil, water), source of contamination, and/or some physical boundary or restraint.

Operation and Maintenance: Activities conducted at a site after a remedy has been constructed, to ensure that the cleanup or containment system continues to operate as designed.

Operation and Maintenance Costs: The cost and time frame of operating labor, maintenance, materials, energy, disposal, and administrative components of the remedy.
Preferred Alternative: Of all the alternatives considered, the preferred alternative is the alternative that is proposed by the EPA to address the site.

Present Value: The amount of money, which is invested in the current year, would be sufficient to cover all the costs over time associated with a remedial action. It is calculated using a predetermined discount rate and interest rate.

Proposed Plan: A document requesting public input on a proposed remedial alternative.

Record of Decision: A document which is a consolidated source of information about the site, the remedy selection process, and the Selected Remedy for a cleanup under CERCLA.

Remedial Action: Action taken to clean up contamination at a site to acceptable standards.

Remedial Action Objectives: General descriptions of what the cleanup will accomplish (e.g., restoration of contaminated groundwater to drinking water levels).

Remedial Investigation (RI): A detailed study of a site to characterize the nature and distribution of contaminants at the site. The RI includes a baseline human health risk assessment (HHRA) that assesses the potential impact of site-related contamination on human health. The RI typically also includes an assessment of the potential risk to the environment. The RI may include an investigation of air, soil, surface water, and groundwater to determine the source(s), types of contaminants, and extent of contamination at a site.

Soil Vapor Extraction: Typically used to remove VOCs from soil. A vacuum is applied to subsurface soil inducing an air stream through the soil, thereby transferring the VOC contaminants from the soil to the air. The contaminant-laden air, or soil vapor, is extracted from the subsurface with a vacuum blower and discharged to the atmosphere. Prior to discharge to the atmosphere the soil vapor may be treated to reduce contaminant levels.

Toxicity: A measure of the degree to which a substance is harmful to humans and the environment (plants, animals, etc.)

Volatile Organic Compound: An organic compound which evaporates readily to the atmosphere.

Table 1- EPA Repairs and Upgrades to Existing SVE and GET Systems		
Date	**System**	**Activity**
Oct. 2006	GET	Replaced a submersible pump/motor and controller for groundwater recovery well and installed a sampling port RW-4.
2007	SVE	Reconfigure the discharge of the SVE system. The vapor effluent was rerouted to bypass the catalytic oxidizer unit and discharge without treatment.
Feb. 2007	GET	Installed air stripper system to treat extracted groundwater from RWs.
July 2007	GET	Replaced RW-1 submersible pump/motor and controller.
Dec. 2008	GET	Replaced the pump controller for groundwater recovery well RW-2.
Jan. 2009	GET	Installed a new heater for the equipment building after the existing heater failed. Larger unit installed to prevent freezing of the groundwater extraction system during winter months.
Apr. 2009		Replaced the submersible pump/motor for groundwater recovery well RW-2 and replaced the total flow meter for the groundwater extraction system.
May 2009	SVE	Installed drain ports along individual SVE well lines inside the equipment building.
May 2009	GET	Replaced the water pressure gauge on the air stripper, and also replaced the sight gauge at the base of the air stripper sump.
Sept. 2009	GET	Replaced the submersible pump/motor and controller for groundwater recovery well RW-2.
June 2010	GET	Replaced the submersible pump/motor for groundwater recovery well RW-1.
Sept. 2010	SVE	Purchased and installed a new Sutorbilt blower for the SVE system after the existing blower failed.
Mar. 2011	GET	Replaced the pump controller for RW-3.
Sept. 2011	GET	Replaced the submersible pump/motor and controller for groundwater recovery well RW-4.
Oct. 2012	GET	Replaced a backflow prevention device in the equipment building.
July 2012	GET	Replaced a faulty contactor and contact block side mount associated with the air stripper discharge pump.
2014	GET	Replaced flow meter. Replaced transduce in RW3.
July 2016	GET	Replaced the discharge pump/motor assembly for the air stripper.
Nov. 2016	GET	Replaced the north heater in the equipment building

Table 2 - Summary of COPCs and Media Specific Exposure Point Concentrations

Operable Unit	Timeframe / Scenario	Medium	Exposure Medium	Exposure Point	Chemical of Concern	Concentration Detected: Max[1]	Concentration Detected: Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure[2]
OU 2	Current / Resident	Groundwater	Groundwater	Off-Property Groundwater	Arsenic[3]	3.4E+00	ug/L	9/12	2.4E+00	ug/L	95%UCL-KMT[4]
					Chromium[3], [5]	2.6E+00[6]	ug/L	9/12	8.7E-01	ug/L	95%UCL-KMT[4]
					Carbon Tetrachloride	1.6E+00	ug/L	1/10[7]	1.6E+00	ug/L	MAX
					Chloroform	1.0E+00	ug/L	1/10[7]	1.0E+00	ug/L	MAX
					Tetrachloroethene	1.8E+02	ug/L	10/10[7]	1.2E+02	ug/L	95%UCL-ST[8]

Notes:

(1) Maximum detected concentrations

(2) The statistical measure of detections that is used for screening

(3) Concentrations of the constituent determined to be consistent with background levels. Site-related risks associated with the constituent not considered in future calculations.

(4) Non-parametric; use 95% Kaplan-Meier (t) Method (95%UCL-KMT)

(5) Total chromium concentrations used to develop exposure point concentrations. Assumption is that all chromium is present as hexavalent chromium.

(6) One sample (MW-105A) was excluded from the statistical evaluation due to elevated turbidity (> 50 NTU).

(7) EPCs are the maximum detected subslab soil gas samples multiplied by an attenuation factor of 0.03

(8) Normal; use 95% Student's-t Method (95% UCL-ST)

Table 3 – Cancer Toxicity Data Summary							
Pathways: Ingestion and Dermal							
COPC	**Oral Cancer Slope Factor**		**Adjusted Dermal Slope Factor(1)**		**Weight of Evidence / Cancer Guideline Description**	**Oral CSF**	
	Value	**Units**	**Value**	**Units**		**Source**	**Date(2)**
Arsenic	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	Apr-16
Chromium	5.0E-01	$(mg/kg\text{-}day)^{-1}$	2.0E+01	$(mg/kg\text{-}day)^{-1}$	A	NJDEP	Apr-16
Carbon Tetrachloride	7.0E-02	$(mg/kg\text{-}day)^{-1}$	7.0E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	Apr-16
Chloroform	3.1E-02	$(mg/kg\text{-}day)^{-1}$	3.1E-02	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	Apr-16
Tetrachloroethene	2.1E-03	$(mg/kg\text{-}day)^{-1}$	2.1E-03	$(mg/kg\text{-}day)^{-1}$	LI	IRIS	Apr-16

Pathway: Inhalation					
COPC	**Unit Risk**		**Weight of Evidence/Cancer Guideline Description**	**Unit Risk Inhalation CSF**	
	Value	**Units**		**Source**	**Date(2)**
Arsenic	4.3E-03	$(\mu g/m^3)^{-1}$	A	IRIS	Apr-16
Chromium	8.4E-02	$(\mu g/m^3)^{-1}$	A	IRIS	Apr-16
Carbon Tetrachloride	6.0E-06	$(\mu g/m^3)^{-1}$	B2	IRIS	Apr-16
Chloroform	2.3E-05	$(\mu g/m^3)^{-1}$	B2	IRIS	Apr-16
Tetrachloroethene	2.6E-07	$(\mu g/m^3)^{-1}$	LI	IRIS	Apr-16

Notes:

IRIS – Integrated Risk Information System

NJDEP - New Jersey Department of Environmental Protection

CalEPA – California EPA

CSF – Cancer Slope Factor

Hexavalent chromium toxicity values were used for chromium

mg/kg-day – milligrams per kilogram per day

$\mu g/m^3$ – micrograms per cubic meter

(1) (Oral CSF)/(Oral to Dermal Adjustment Factor) = Adjusted Dermal CSF.
Source for Oral to Dermal Adjustment Factor: RAGS Vol 1: Human Health Supplemental Guidance for Dermal Risk Evaluation Manual (Part E, Assessment), EPA, 2004.

(2) For IRIS values, date that IRIS was searched. For other values, date of the EPA RSL table.

Weight of Evidence:

A - Human carcinogen

B1 - Probable human carcinogen - sufficient evidence in animals to show probable human carcinogenic effects and limited evidence in humans

B2 - Probable human carcinogen - sufficient evidence in animals to show probable human carcinogenic effects

and inadequate or no evidence in humans

C - Possible human carcinogen

to show probable human carcinogenic effects and

D - Not classifiable as to human carcinogenicity

LI - likely to be carcinogenic to humans

Table 4 – Noncancer Toxicity Data Summary

Pathways: Ingestion and Dermal

Chemical of Potential Concern	Chronic / Subchronic	Oral RfD		Adjusted Dermal RfD		Primary Target Organ	Combined Uncertainty / Modifying Factors	Source of RfD: Primary Target Organ Source(s)	Date of RfD: Primary Target Organ Source
		Value	Units	Value	Units				
Arsenic	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Skin/Vascular	3/1	IRIS	Apr-16
Chromium	Chronic	3.0E-03	mg/kg-day	7.5E-05	mg/kg-day	None Reported	300/3	IRIS	Apr-16
Carbon Tetrachloride	Chronic	4.0E-03	mg/kg-day	4.0E-03	mg/kg-day	Liver	1000/1	IRIS	Apr-16
Chloroform	Chronic	1.0E-02	mg/kg-day	1.0E-02	mg/kg-day	Liver	100/1	IRIS	Apr-16
Tetrachloroethene	Chronic	6.0E-03	mg/kg-day	6.0E-03	mg/kg-day	Neurological	1000/1	IRIS	Apr-16

Pathway: Inhalation

Chemical of Potential Concern	Chronic / Subchronic	RfC[1]		Primary Target Organ	Combined Uncertainty / Modifying Factors	Source of RfC: Primary Target Organ Source(s)	Date of RfC[2]: Primary Target Organ Source
		Value	Units				
Arsenic	Chronic	1.5E-05	mg/m^3	Development, Vascular system, Nervous system	N/A	CalEPA	Apr-16
Chromium	Chronic	1.0E-04	mg/m^3	Lungs	300/1	IRIS	Apr-16
Carbon Tetrachloride	Chronic	1.0E-01	mg/m^3	Liver	N/A	IRIS	Apr-16
Chloroform	Chronic	9.8E-02	mg/m^3	Liver	N/A	ATSDR	Apr-16
Tetrachloroethene	Chronic	4.0E-02	mg/m^3	Neurological	N/A	IRIS	Apr-16

Notes:

ATSDR – Agency for Toxic Substances and Disease Registry

CalIEPA - California EPA

IRIS – Integrated Risk Information System

mg/m^3 – milligrams per cubic meter

mg/kg-day – milligrams per kilogram per day

N/A - Not Applicable

RfC – Reference Concentration

RfD – Reference Dose

Hexavalent chromium toxicity values were used for chromium

[1] Oral RfD*Oral to Dermal Adjustment Factor - Adjusted Dermal RfD

[2] For IRIS values, date that IRIS was searched. For other values, date of the EPA RSL table.

Table 5 – Risk Characterization Summary – Carcinogens

Scenario Timeframe: Current
Receptor Population: Off-property Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Total
Groundwater	Groundwater	Tap water	Arsenic	Background Constituent			
			Chromium	Background Constituent			
			Carbon Tetrachloride	1.7E-06	1.5E-06	4.4E-07	3.6E-06
			Chloroform	4.6E-06	3.5E-06	4.1E-08	4.0E-06
			Tetrachloroethene	3.8E-06	4.8E-06	2.2E-06	1.1E-05
						Groundwater Risk Total	1.8E-05
						Receptor Population Risk	**1.8E-05**

Table 6 – Risk Characterization Summary – Non-carcinogens

Scenario Timeframe: Current
Receptor Population: Off-property Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Non-carcinogenic Hazard Quotient				
				Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Total
Groundwater	Groundwater	Tap water	Arsenic	Skin/Vascular	Background Constituent			
			Chromium	Non Reported	Background Constituent			
			Carbon Tetrachloride	Liver	0.03	0.006	0.007	0.04
			Chloroform	Liver	0.006	0.004	0.0006	0.01
			Tetrachloroethene	Neurological	1	1	0.7	3
							Groundwater Hazard Index Total	3
							Total Hazard Index Across All Media	**3**
							Total Liver HI Across All Media =	**0.05**
							Total Neurological HI Across All Media =	**3**

Table 7 – Summary of COCs		
		OU 2
HHRA		
	Groundwater	PCE
SLERA		
	Groundwater	N/A

Table 8 - Cleanup Levels for COCs

OPERABLE UNIT 2
Media: Groundwater
Current Use: Mixed
Anticipated Use: Mixed[a]
Available Use[a]: Unrestricted
Controls to Ensure Restricted Use[b]: Institutional controls

Chemical of Concern	Cleanup Level (µg/l)	Basis for Cleanup Level
Tetrachloroethene	5	Compliance with Federal and state ARARs
Trichloroethene[c]	5	Compliance with Federal and state ARARs
Cis-1,2-dichloroethene[c]	70	Compliance with Federal and state ARARs
Trans-1,2-dichloroethene[c]	100	Compliance with Federal and state ARARs
Vinyl chloride [c]	2	Compliance with Federal and state ARARs

Notes:
(a) Anticipated available use at the conclusion of remedial activities (i.e. upon achieving cleanup levels).
(b) Controls to ensure use is restricted during the conduct of remedial activities.
(c) Potential breakdown product of tetrachloroethene.

Table 9 – Comparative Analysis of Remedial Alternatives for OU 2 Groundwater			
Criteria	**G1**	**G3**	**G4**
OVERALL EFFECTIVENESS			
Human Health Protection			
Ingestion, inhalation, and dermal exposure	Existing IC addresses risk in the short term by preventing exposure pathway of potable water well use. Monitoring ICs prevents future exposures in the current IC area. No reduction in potential future risk if contamination migrates outside IC area.	Existing IC addresses risk in the short term by preventing exposure pathway of potable water well use. Monitoring ICs prevents future exposures in the current IC area. During remedial activities, effective long-term protection through hydraulic control and capture of contaminated groundwater to prevent migration to areas outside existing IC. Long-term protection after remedial actions are complete and cleanup levels have been achieved.	Same as Alternative G3.
Environmental Protection			
Groundwater migration	Does not prevent migration.	OU 2 GET system would contain groundwater at the leading edge of the plume and prevent aquifer degradation to downgradient areas. Performance monitoring during remedial action would ensure continued containment and be used to assess progress to achieving cleanup levels in the OU 2 plume. Eventually restores the aquifer to its beneficial use after remedial activities when cleanup levels are achieved	Same as Alternative G3.
COMPLIANCE WITH ARARs			
Chemical-Specific ARARs	N/E	Addresses federal SDWA and state Title 118 by achieving ARARs at the conclusion of remedial action.	Same as Alternative G3.
Location-Specific ARARs	N/E	Construction of recovery, injection and monitoring wells would be compliant with all location-specific ARARs.	Same as Alternative G3.
Action-Specific ARARs	N/E	OU 2 GET system would treat extracted groundwater via air stripping. It is estimated the air stripper would meet federal and state air emission requirements. Treated effluent would be monitored to ensure the state's Title 122 requirements for underground injection are met.	Same as Alternative G3.
LONG-TERM EFFECTIVENESS AND PERMANENCE			
Magnitude of Residual Risk	N/E	At the conclusion of the RA, groundwater would achieve groundwater cleanup levels.	Same as Alternative G3.
Adequacy and Reliability of Controls	N/E	Controls would not be necessary to manage, because treated residuals and/or untreated waste will remain.	Same as Alternative G3.
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT			
Treatment Process Used	N/E	Air stripping is a proven and reliable transfer technology, removing VOCs in water and transferring them to the atmosphere. This alternative satisfies the statutory preference for treatment.	Same as Alternative G3.

Table 9 – Comparative Analysis of Remedial Alternatives for OU 2 Groundwater

Criteria	G1	G3	G4
Amount Destroyed or Treated	N/E	Estimate of contaminant mass not available, but Alternatives G3, and G4 destroy approximately the same quantity to achieve MCLs in aquifer.	Same as Alternative G3.
Reduction of Toxicity, Mobility, or Volume	N/E	Prevents contaminant mobility to areas downgradient of the leading edge extraction wells. Treatment of captured and extracted groundwater by air stripping removes contaminants to reduce toxicity. Throughout OU 2, the volume of groundwater that exceeds MCLs would be eliminated.	Same as Alternative G3.
Irreversible Treatment	N/E	Yes	Same as Alternative G3.
Type and Quantity of Residuals Remaining after Treatment	N/E	Any remaining adsorbed residual contamination in the aquifer would not impact groundwater above MCLs.	Same as Alternative G3.
SHORT-TERM EFFECTIVENESS			
Protection of the Community During Remedial Actions	N/E	As with any construction activity, it may pose short-term risk to the community. Safety measures such as establishment of work zones would be implemented to reduce risk. Installation of recovery, injection and monitoring wells would be performed by a licensed contractor, who would handle investigation derived waste (IDW), such as drill cuttings and development water, in accordance with ARARs.	Same as Alternative G3, with approximately twice amount of construction activities and corresponding increase safety measures and the very minimal risk to the community.
Protection of Workers during Remedial Actions	N/E	All workers would be OSHA trained and required to wear appropriate PPE during implementation.	Same as Alternative G3, with approximately twice amount of construction activities and corresponding increase in the very minimal risk to properly trained workers.
Environmental Impacts	N/E	No adverse impacts to the environment are expected from the installation of recovery, monitoring and injection wells and piping. Emissions from the air stripper would be below state regulatory requirements.	Same as Alternative G3.
Time Until Remedial Action Objectives are Achieved	N/E	RAOs estimated to be achieved in 30 years.	RAOs estimated to be achieved in 16 years.
IMPLEMENTABILITY			
Technical Feasibility	N/E	Implementation of this alternative involves installation of recovery, injection and monitoring wells using standard drilling equipment and installation techniques. Inspection, maintenance, and replacement of engineered controls are easily implemented. Pump and treat is a presumptive remedy. Operation and maintenance of a properly designed and constructed pump and treat system is straightforward.	Same as Alternative G3, with approximately twice amount of constructed features, and a corresponding increase in the potential technical difficulties and unknowns.

Table 9 – Comparative Analysis of Remedial Alternatives for OU 2 Groundwater

Criteria	G1	G3	G4
Administrative Feasibility	N/E	Requires locating wells, pipelines, and treatment system in existing right-of-way or entering easement agreements with property owners. Injection of treated effluent would require meeting the state's underground injection control requirements.	Same description as Alternative G2, with a greater number of easement agreements required for mid-plume extraction wells and pipelines. Mid-plume extraction wells would be in close proximity to federally designated wetlands, which will increase administrative requirements for construction.
Availability of Services and Materials	N/E	No off-site treatment or storage required. No specialized drilling equipment required. Materials, equipment, and labor resources used for installation of recovery, injection and monitoring wells are readily available. Tray air strippers available from a variety of vendors.	No off-site treatment or storage required. No specialized drilling equipment required. Materials, equipment, and labor resources used for installation of recovery, injection and monitoring wells are readily available. Tray air strippers available from a variety of vendors.

N/E = Not evaluated

Table 10 –Summary of Estimated Costs for Remedial Alternatives, West Highway 6 and Highway 281 Superfund Site					
Alternative	**Estimated Time Frame (years)**	**Capital Construction Cost ($1,000's)**	**Total Annual O&M Cost ($1,000's)**	**Periodic Cost ($1,000's)**	**Total Present Value ($1,000's)**
OU 2 Groundwater					
G1 – No Action	30	$92	$186	$372	$214
G3 – Groundwater Recovery, Treatment, and Discharge at Leading Edge of Plume	30	$4,470	$9,938	$538	$9,017
G4 – Groundwater Recovery, Treatment, and Discharge at Mid-plume and Leading Edge of Plume	16	$8,042	$7,870	$316	$12,757
Notes: 7 percent discount rate. Costs are rounded to the nearest $1,000. Capital costs for deconstruction and decommissioning of systems are included with capital construction costs.					

Table 11 – Summary of Detailed Analysis of Alternatives
West Highway 6 and Highway 281 Superfund Site

Alternative	Threshold Criteria		Balancing Criteria							
	Overall Protection of Human Health and Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Mobility or Volume through Treatment	Short-Term Effectiveness	Implement-ability	Cost ($1,000s)			
							Capital	Annual O&M	Periodic	Present Value
OU 2 Groundwater										
G1	-	-	N/E	N/E	N/E	N/E	$92	$186	$372	$214
G3	+	+	4	4	3	4	$4,470	$9,938	$538	$9,017
G4	+	+	4	4	4	3	$8,042	$7,870	$316	$12,757

Legend for Qualitative Ratings System:
- Unacceptable
+ Acceptable
0 – None
1 – Low
2 – Low to moderate
3 – Moderate
4 – Moderate to high
5 – High
N/E = Not evaluated

Table 12 – Cost Estimate Summary for the Selected Remedy, OU 2

Alternative G4 – Groundwater Recovery, Treatment, and Discharge at Mid-plume and Leading Edge of Plume

Description	Quantity	Units	Unit Cost	Total Line Item Cost
CAPITAL COSTS				
Incurred During Year 0				
General Requirements (project staff, temporary facilities, mobilization/demobilization, surveying, erosion and sediment control, etc.)	1	LS	$531,102	$689,100
Institutional Controls	1	LS	$29,525	$29,525
Recovery Well Installation	9	EA	$111,790	$1,006,107
Re-injection Well Installation	6	EA	$114,866	$689,196
Monitoring Well Installation	20	EA	$16,974	$339,466
Development Water Treatment	1	LS	$149,180	$149,180
Recovery Well Control Building	2	EA	$167,030	$334,060
Piping	1	LS	$1,216,760	$1,216,760
Groundwater Treatment Plant (includes air stripper treatment system)	1	EA	$328,935	$328,935
Site Restoration	1	EA	$12,668	$12,668
Treatment System Startup Testing	1	EA	$43,222	$43,222
			Subtotal	$4,838,219
Contingency (20% Scope and 10% Bid) (30%)				$1,451,466
			Subtotal	$6,289,685
Remedial Design (8%)				$503,175
Project Management (5%)				$314,848
Construction Management (6%)				$377,381
			Total Capital Cost Incurred During Year 0 [a]	$7,485,000
Incurred During Year 16				
Monitoring Well Abandonment	32	EA	$3,297	$105,502
Recovery Well Abandonment	9	EA	$10,644	$95,793
Re-injection Well Abandonment	6	EA	$13,285	$79,706
Decommissioning Treatment System	1	LS	$67,868	$67,868
			Subtotal	$348,869
Contingency (Scope and Bid) (20%)				$69,774
			Subtotal	$418,643
Remedial Design (15%)				$33,491
Project Management (8%)				$62,796
Construction Management (10%)				$41,864
			Total Future Capital Cost Incurred in Year 16 [a, b]	$557,000
			TOTAL CAPITAL COSTS *(Incurred in Years 0 and 16)*[a, b]	$8,042,000

Table 12 – Cost Estimate Summary for the Selected Remedy, OU 2 (cont.) Alternative G4 – Groundwater Recovery, Treatment, and Discharge at Mid-plume and Leading Edge of Plume				
OTHER COSTS				
Description	**Quantity**	**Units**	**Unit Cost**	**Total Line Item Cost**
Quarterly Monitoring Annual Costs (Incurred during year 1)				
Groundwater Sampling Event	4	EA	$28,168	$112,669
Groundwater Monitoring Event Report	4	EA	$16,473	$65,891
			Subtotal	$178,560
Contingency (Scope and Bid) (20%)				$35,712
			Subtotal	$214,272
Project Management (8%)				$17,142
Technical Support (15%)				$32,141
			Total Annual Monitoring Costs [a, b]	**$264,000**
Semiannual Monitoring Costs (Incurred During Years 2 through 5)				
Groundwater Sampling Event	2	EA	$28,167	$56,334
Groundwater Monitoring Event Report	2	EA	$16,473	$32,946
			Subtotal	$89,280
Contingency (Scope and Bid) (20%)				$17,856
			Subtotal	$107,136
Project Management (8%)				$8,571
Technical Support (15%)				$16,070
			Total Annual Monitoring Costs [a, b]	**$132,000**
Annual Monitoring Costs (Incurred During Years 6 through 16)				
Groundwater Sampling Event	1	EA	$28,167	$28,167
Groundwater Monitoring Event Report	1	EA	$16,473	$16,473
			Subtotal	$44,640
Contingency (Scope and Bid) (20%)				$8,928
			Subtotal	$53,568
Project Management (10%)				$5,357
Technical Support (15%)				$8,035
			Total Annual Monitoring Costs [a, b]	**$67,000**

Table 12 – Cost Estimate Summary for the Selected Remedy, OU 2 (cont.) **Alternative G4 – Groundwater Recovery, Treatment, and Discharge at Mid-plume and Leading Edge of Plume**				
OTHER COSTS				
Description	**Quantity**	**Units**	**Unit Cost**	**Total Line Item Cost**
Annual GET O&M Costs (Incurred during years 0 through 16)				
O&M of GET Treatment System	1	EA	$252,664	$252,664
			Subtotal	$252,664
Contingency (Scope and Bid) (20%)				$50,533
			Subtotal	$303,197
Project Management (8%)				$24,256
Technical Support (15%)				$45,480
			Total Annual O&M Costs [a, b]	**$373,000**
Five-year Review Periodic Costs (Years 5, 10, 15)				
Five-year Review	1	EA	$40,929	$40,929
			Subtotal	$40,929
Contingency (Scope and Bid) (20%)				$8,186
			Subtotal	$48,115
Project Management (10%)				$4,912
			Total Five-year Review Period Costs [a, b]	**$54,000**
Well Maintenance Periodic Costs (Every 10 years)				
Monitoring Well Maintenance	32	EA	$963	$30,788
Recovery Well Maintenance	9	EA	$4,635	$41,710
Re-injection Well Maintenance	6	EA	$5,013	$30,073
			Subtotal	$102,571
Contingency (Scope and Bid) (20%)				$20,514
			Subtotal	$123,085
Project Management (10%)				$12,309
Technical Support (15%)				$18,463
			Total Well Maintenance Periodic Cost [a, b]	**$154,000**
Notes: [a] Rounded to nearest $1,000 [b] Not adjusted to present value				

Table 13 - Summary of Present Value Analysis for the Selected Remedy, OU 2

Alternative G4 – Groundwater Recovery, Treatment, and Discharge at Mid-plume and Leading Edge of Plume

West Highway 6 and Highway 281 Superfund Site, OU 2

Year[1]	Capital Cost	O&M Costs	Monitoring Costs	Periodic Costs[2]		Total Annual Expenditure[3]	Discount Factor[4]	Present Value[5,6]
				Well Maintenance	Five-year Review Costs			
0	$7,485,000	$373,000	$0	$0	$0	$7,858,000	1.0000	$7,857,933
1	$0	$373,000	$264,000	$0	$0	$637,000	0.9346	$595,327
2	$0	$373,000	$132,000	$0	$0	$505,000	0.8734	$441,087
3	$0	$373,000	$132,000	$0	$0	$505,000	0.8163	$412,230
4	$0	$373,000	$132,000	$0	$0	$505,000	0.7629	$385,262
5	$0	$373,000	$132,000	$0	$54,000	$559,000	0.7130	$398,559
6	$0	$373,000	$67,000	$0	$0	$440,000	0.6663	$293,191
7	$0	$373,000	$67,000	$0	$0	$440,000	0.6227	$274,010
8	$0	$373,000	$67,000	$0	$0	$440,000	0.5820	$256,084
9	$0	$373,000	$67,000	$0	$0	$440,000	0.5439	$239,331
10	$0	$373,000	$67,000	$154,000	$54,000	$648,000	0.5083	$329,410
11	$0	$373,000	$67,000	$0	$0	$440,000	0.4751	$209,041
12	$0	$373,000	$67,000	$0	$0	$440,000	0.4440	$195,365
13	$0	$373,000	$67,000	$0	$0	$440,000	0.4150	$182,584
14	$0	$373,000	$67,000	$0	$0	$440,000	0.3878	$170,640
15	$0	$373,000	$67,000	$0	$54,000	$494,000	0.3624	$179,048
16	$557,000	$373,000	$67,000	$0	$0	$997,000	0.3387	$337,718
TOTALS:	**$8,042,000**	$6,341,000	$1,529,000	$687,081		**$16,228,000**		$12,756,821
TOTAL PRESENT VALUE								**$12,757,000**

Notes:

1 - Duration is estimated for present value analysis. Estimated remedial timeframes are discussed within the FS report.

2 - Periodic cost includes well maintenance, equipment replacement cost and five-year review cost for the respective year.

3 - Total annual expenditure is the total cost per year with no discounting.

4 - Based on discount rate of 7%.

5 - Present value is the total cost per year including a discount factor for that year.

6 - Total present value is rounded to the nearest $1,000. Depreciation is excluded from the present value cost.

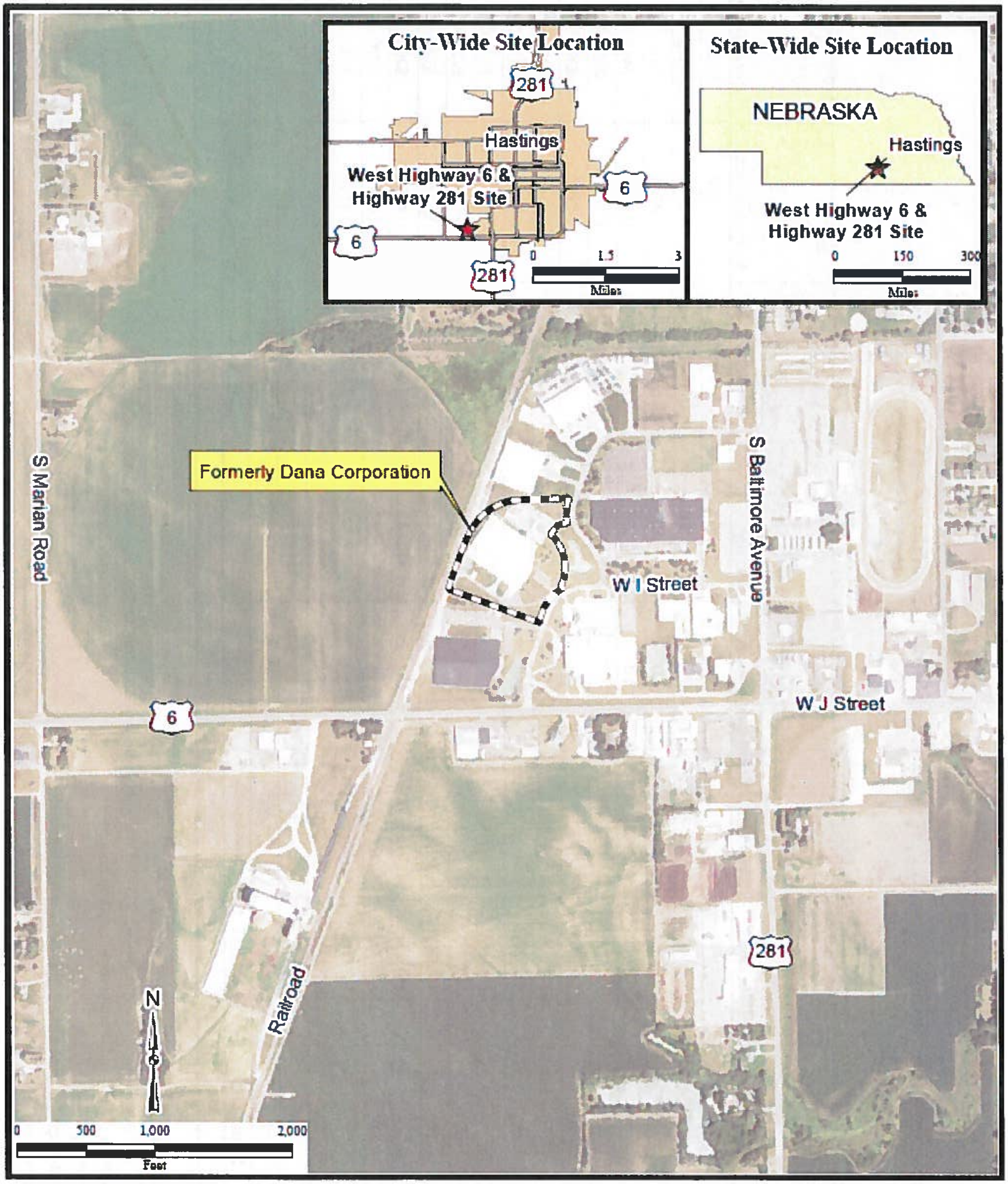


Figure 1 – Site Location Map

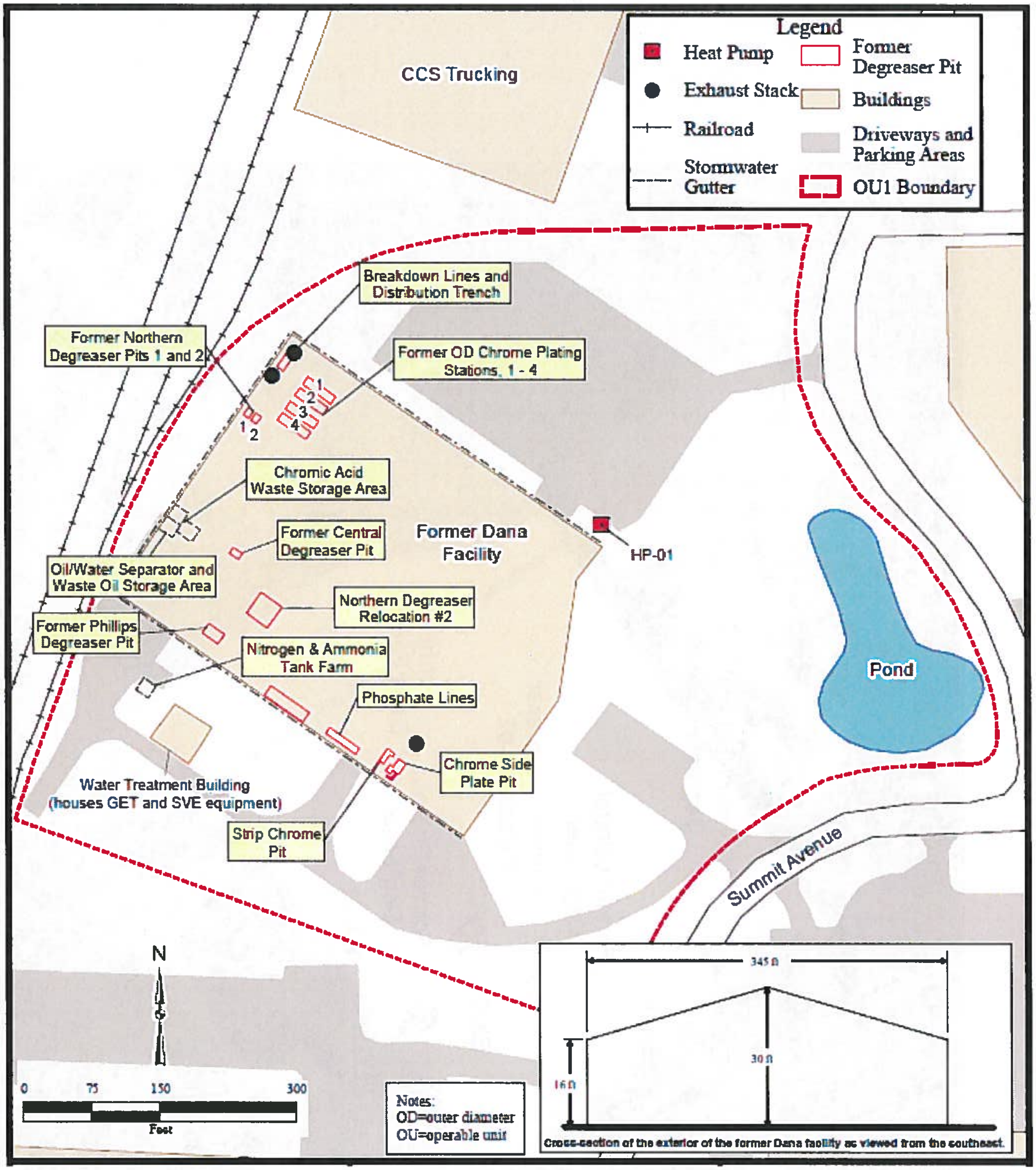


Figure 2 – OU 1 site map.

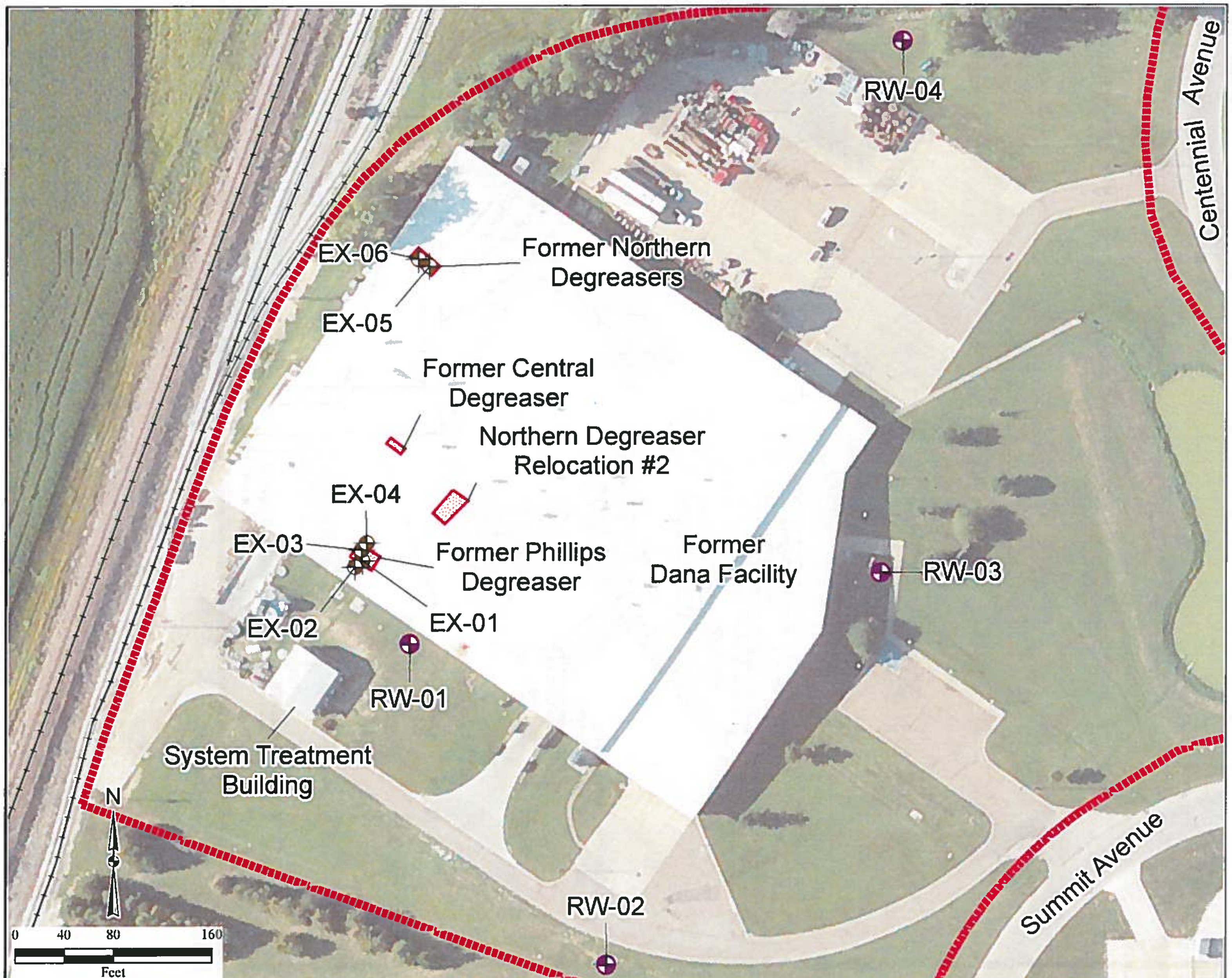


Figure 3 – Existing GET and SVE systems.

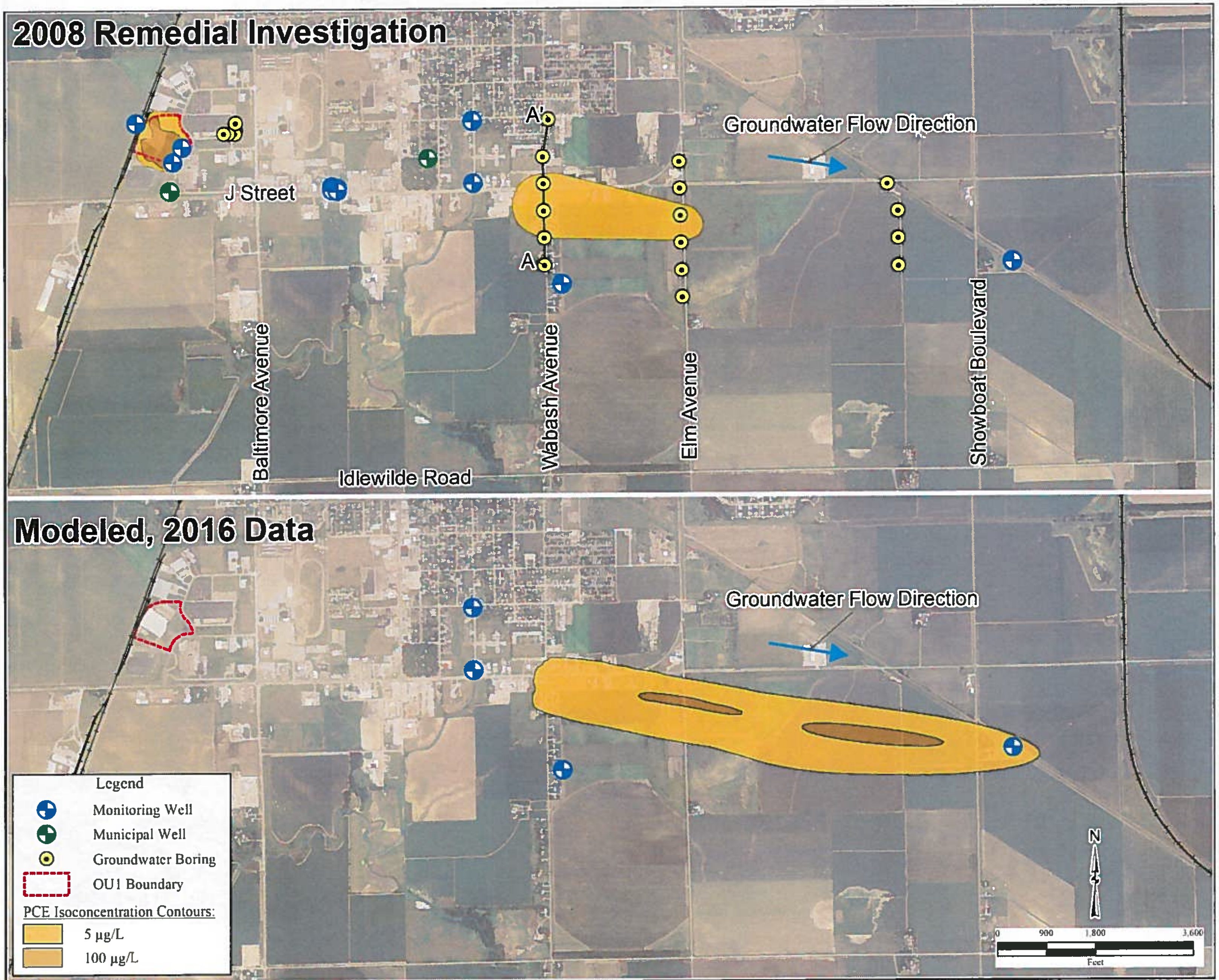


Figure 4 – PCE plume map, Upper Aquifer, 2008 RI Data (top) and forward predicted results (i.e. modeled) with 2016 data (bottom).

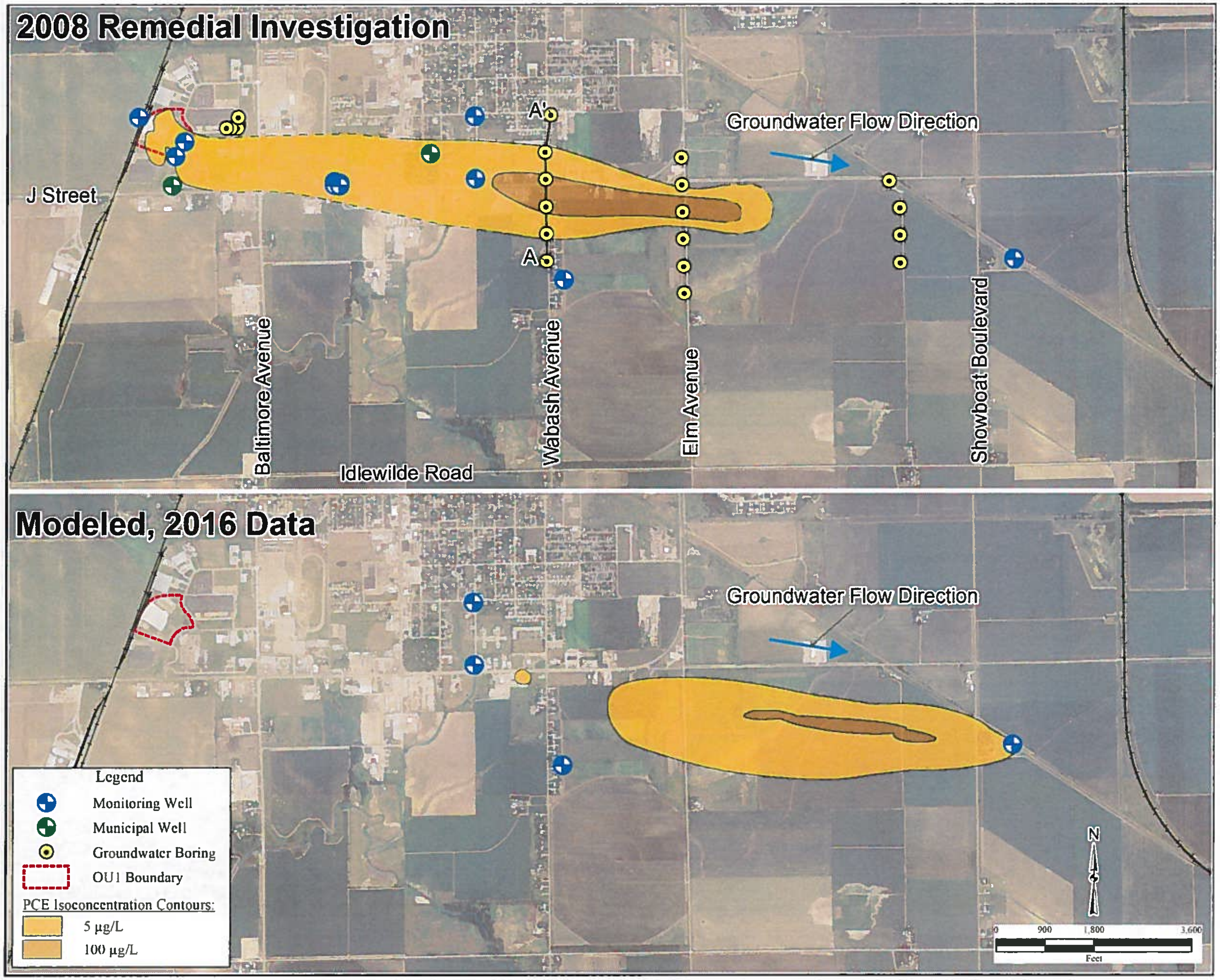


Figure 5 – PCE plume map, Lower Aquifer (125-180 ft bgs), 2008 RI Data (top) and modeled with 2016 data (bottom).

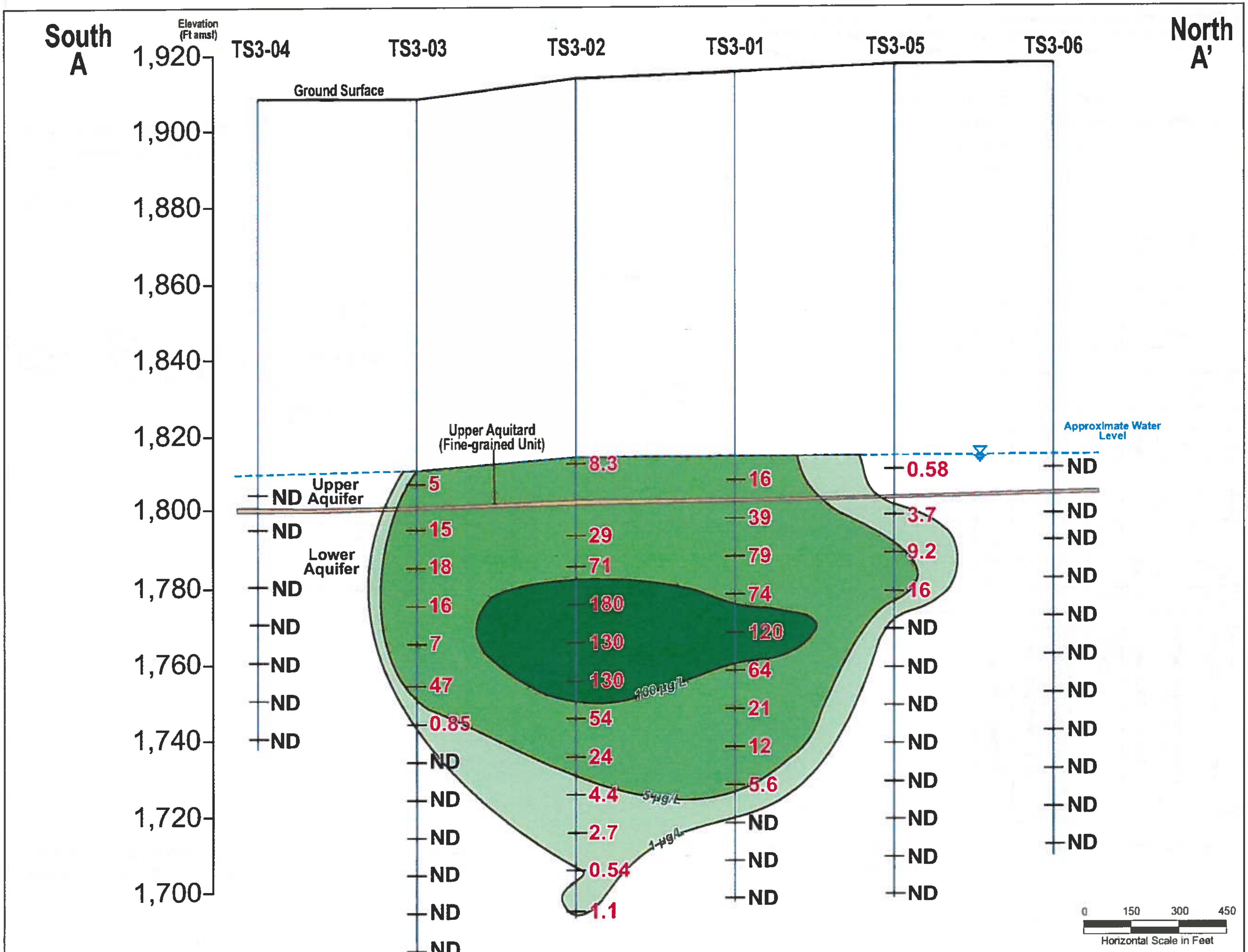
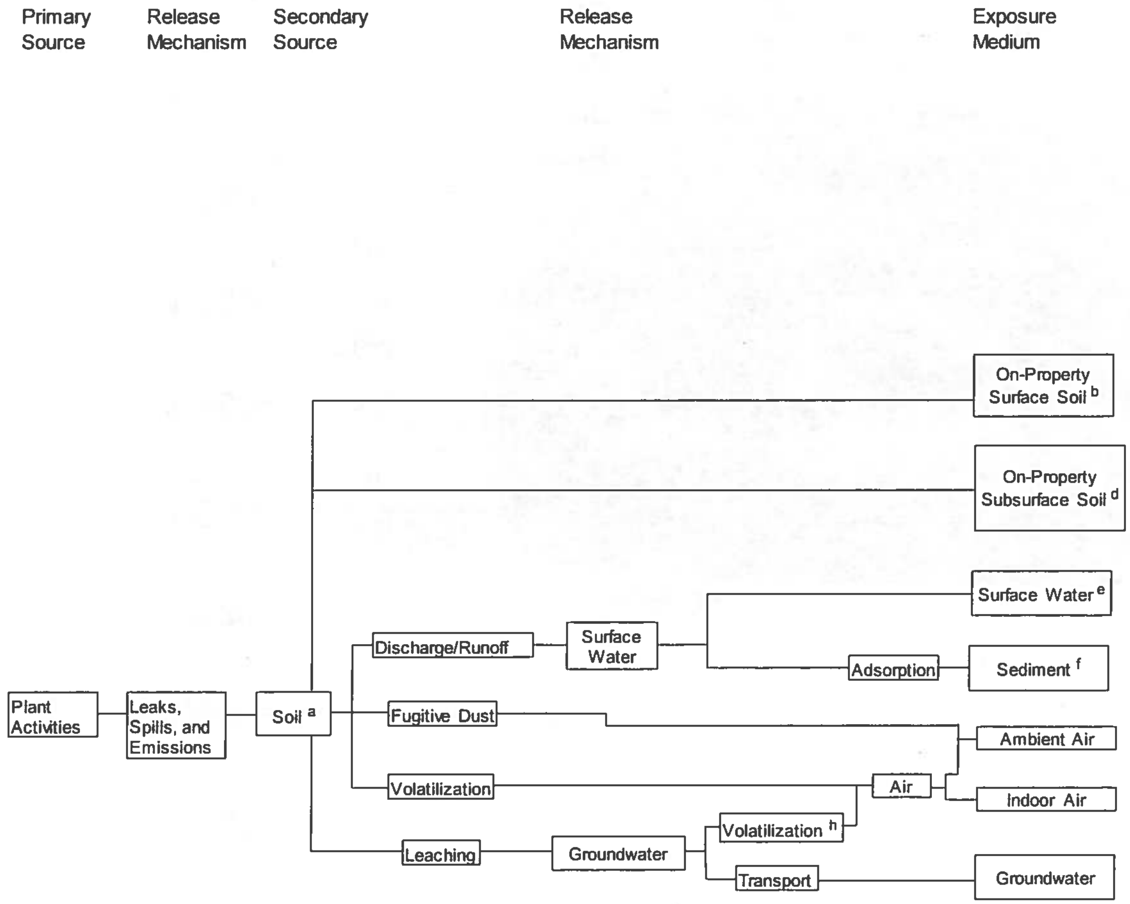


Figure 6 – Cross-section along A-A' illustrating the distribution of PCE in the aquifer (2008 Remedial Investigation).



Potential Human Receptors

Exposure Medium	Exposure Route	Current: Off-Property Resident	Current: Indoor Industrial Worker	Current: Outdoor Industrial Worker	Current: Trespasser	Future: On-Property Resident	Future: Indoor Industrial Worker	Future: Outdoor Industrial Worker	Future: Construction Worker	Future: Trespasser
On-Property Surface Soil [b]	Ingestion		X	X	X	X [c]	X	X [c]	X [c]	X [c]
	Dermal			X	X	X [c]		X [c]	X [c]	X [c]
On-Property Subsurface Soil [d]	Ingestion								X [c]	
	Dermal								X [c]	
Surface Water [e]	Ingestion				X	X				X
	Dermal				X	X				X
Sediment [f]	Ingestion				X					X
	Dermal				X					X
Ambient Air	Inhalation		X [g]	X	X	X	X [g]	X	X	X
Indoor Air	Inhalation	X	X			X	X			
Groundwater	Ingestion	X				X				
	Dermal	X				X				

LEGEND

	Pathway is not complete
X	Pathway may be complete

NOTES:

[a] Soil from the ground surface to the water table.

[b] On-property surface soil from 0 - 6 inches below ground surface.

[c] Includes surface soil that is currently present under the concrete slab of the industrial building.

[d] On-property subsurface soil from 0 to 10 feet below ground surface

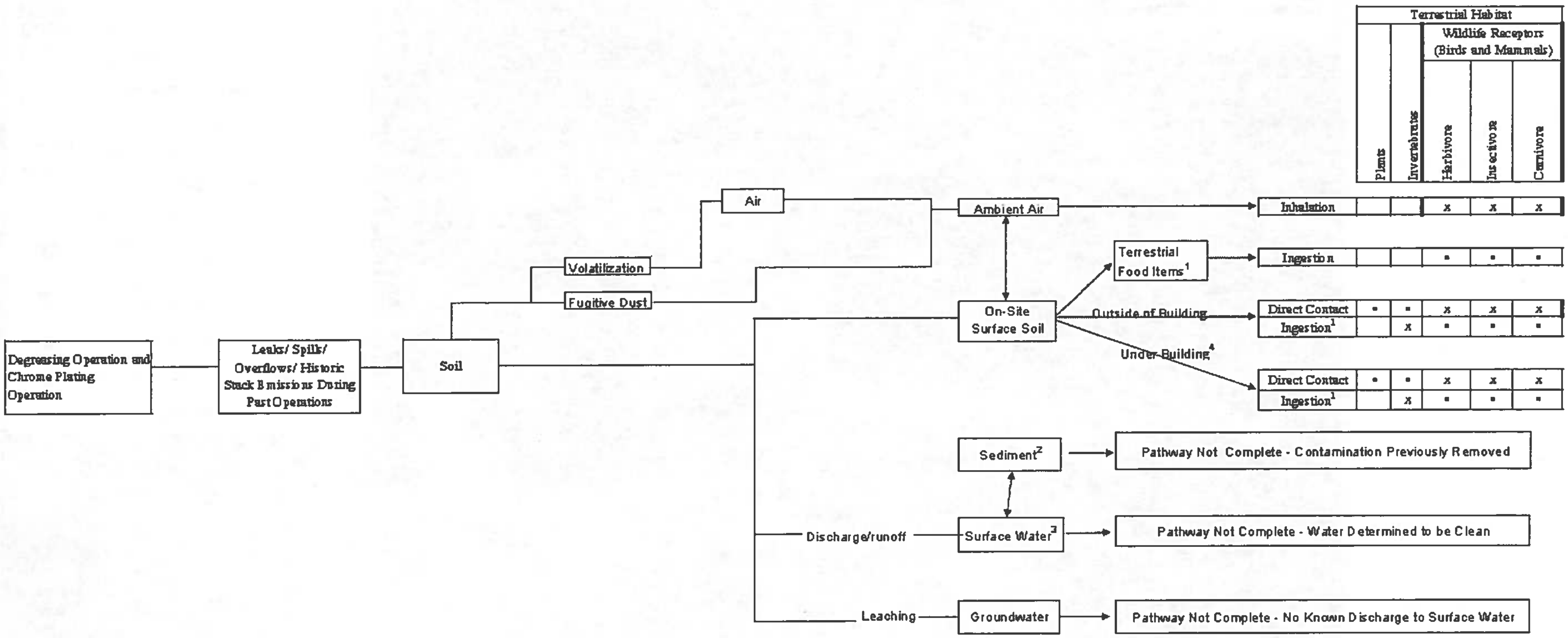
[e] Retention pond adjacent to source area property.

[f] The future resident was conservatively assumed to live in the area of highest soil concentrations, near the industrial building. Based on the distance from this area to the pond, the potential exposure route for the future resident to be exposed to sediment was consider to be incomplete.

[g] Minor exposure pathway.

[h] Groundwater is ~ 120 feet bgs and is therefore not expected to be a source to indoor air.

Figure 7 - Conceptual site model for human exposure.



Notes:

	Pathway is not complete
x	Pathway may be complete, but is judged to be minor or methods are not available to perform quantitative assessment
o	Pathway may be complete, but data are lacking to perform quantitative assessment
•	Pathway is complete

[1] Dermal contact no evaluated because methods for such analysis are not available
[2] Sediment in the on-site pond was dredged/and confirmation sampling indicated that contamination had been removed.
[3] Surface water in the on-site pond has been tested clean due to the removed/remediated of contaminated sediment.
[4] Applies only to future use with the building removed

Figure 8 - Conceptual site model for ecological exposure.

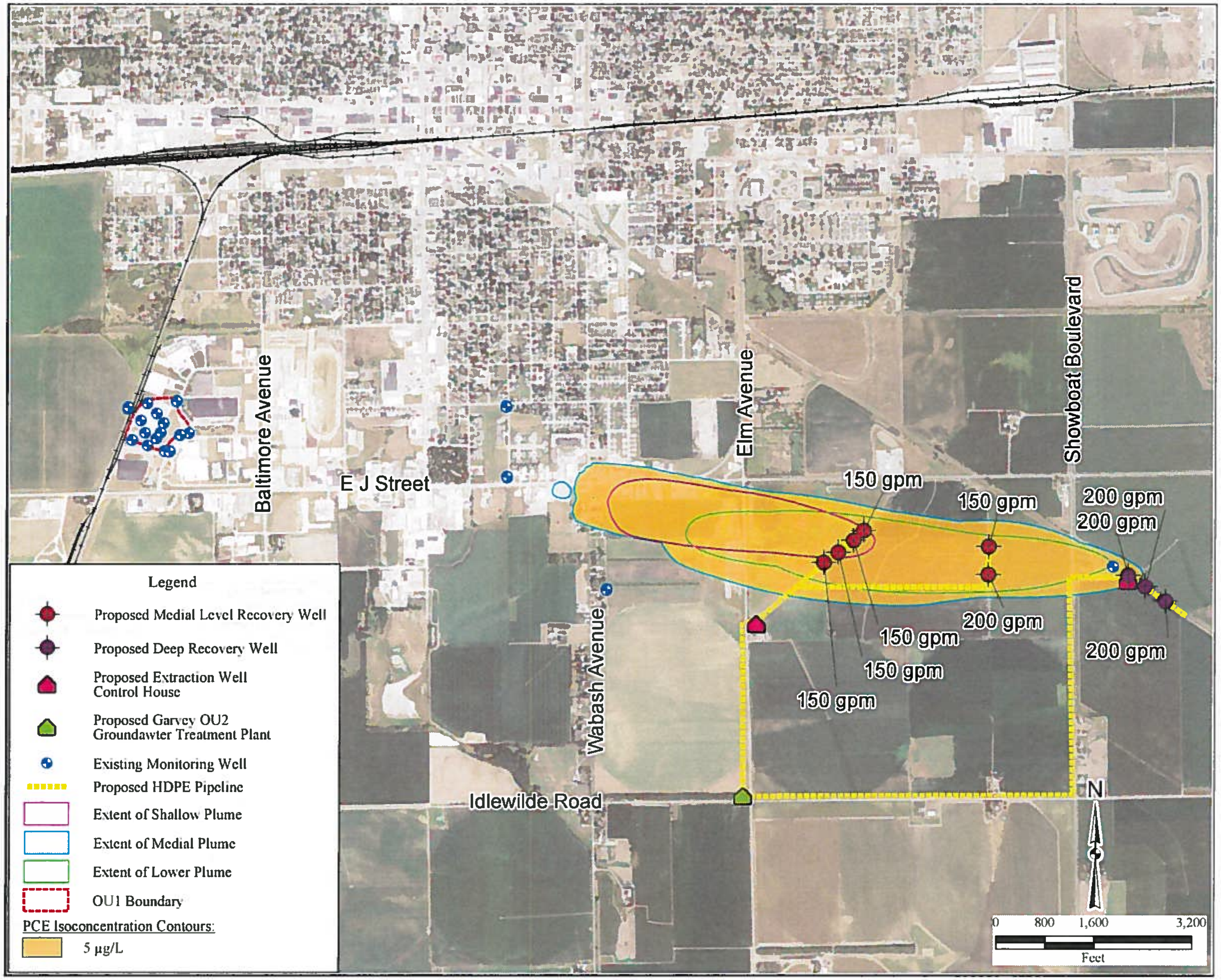


Figure 9 – Groundwater recovery wells and other features of the OU 2 Selected Remedy.

Appendix A

Summary of Chemical-,
Location-, and Action-Specific Applicable or Relevant and Appropriate Requirements

Statute and Regulatory Citation	ARAR Determination	Description	Comments	Medium: Groundwater	Type of ARAR		
					Chemical	Location	Action
FEDERAL ARARs							
Safe Drinking Water Act, 42 U.S.C § 300f, et seq., National Primary and Secondary Drinking Water Regulations, 40 CFR Parts 141 and 142	Relevant and Appropriate	The National Primary and Secondary Drinking Water Regulations (40 CFR Parts 141 and 143) establish MCLs for chemicals in drinking water distributed in public water systems. These are enforceable in Nebraska under NRS § 81-1505(1)(2), et seq., § 71-5301 to 71-5313 (SDWA), NDHHS Title 179, and NDEQ Title 118, Chapter 4.	The Preamble to the NCP clearly states that MCLs are relevant and appropriate for groundwater that is a current source of drinking water. See 55 Federal Register 8750, March 8, 1990, and 40 CFR § 300.430(e)(2)(I)(B). MCLs developed under the SDWA generally are ARARs for current or potential drinking water sources. See EPA Guidance on Remedial Action for Contaminated Groundwater at Superfund Sites, OSWER Directive Number 9283.1-2, December 1988.	X	X		
Federal Surface Water Quality Requirements, Clean Water Act, 33 U.S.C. § 1251, et seq.	Applicable	As provided under Section 303 of the Clean Water Act, 33 U.S.C. § 1313, the State of Nebraska has promulgated water quality standards in NDEQ Title 117, Chapter 4.	None	X	X		
Air Emission Standards for Process Vents, 40 CFR 264, Subpart AA	Relevant and Appropriate	This provision establishes standards for air emissions of VOCs during air stripping operations.	None	X	X		
Air Emission Standards for Equipment Leaks, 40 CFR 264, Subpart BB	Relevant and Appropriate	This provision establishes standards for air emissions for equipment leaks.	None	X	X		
RCRA and regulations, 40 CFR § 264.18 (a) and (b)	Relevant and Appropriate	Regulations promulgated under NRS § 81-1505(13), et seq., specify requirements that apply to the location of any solid waste management facility.	None	X		X	
RCRA deed notice for hazardous wastes remaining on site after closure - 40 CFR 264.119 and 265.119	Relevant and Appropriate	Deed restrictions.	None	X		X	

Statute and Regulatory Citation	ARAR Determination	Description	Comments	Medium: Groundwater	Type of ARAR		
					Chemical	Location	Action
Clean Water Act Point Source Discharges Requirements, 33 U.S.C. § 1342	Applicable	Section 402 of the Clean Water Act, 33 U.S.C. § 1342, et seq., authorizes the issuance of permits for the "discharge" of any "pollutant." This includes stormwater discharges associated with "industrial activity." See 40 CFR § 122.1 (b)(2)(iv). "Industrial activity" includes inactive mining operations that discharge stormwater contaminated by contact with, or that has come into contact with any overburden with, any over burden, raw material, intermediate products, finished products, byproducts, or waste products located on the site of such operations, see 40 CFR § 122.26 (b)(14)(iii); landfills, land application sites, and open dumps that receive or have received any industrial wastes including those subject to regulation under RCRA Subtitle D, see 40 CFR § 122.26(b)(14)(x)	Because the State of Nebraska has been delegated the authority to implement the Clean Water Act, these requirements are enforced in Nebraska through the NPDES. The NPDES requirements are set forth below. EPA is not required to obtain permits from federal, state, or local entities but must still meet the substantive requirements of the permits.	X			X
Groundwater Monitoring 40 CFR Part 264 and Part 265 Subpart F and Part 270.14 (c)	Applicable	Sets forth requirements for groundwater monitoring.	The groundwater monitoring requirements found at 40 CFR Part 264 and Part 265 Subpart F and Part 270.14 (c) are incorporated in Nebraska Title 128 (hazardous waste regulations).	X			X
On-Site Groundwater Treatment 40 CFR Part 264 and Part 265 Subparts I and J	Applicable	Sets forth requirements for on-site treatment of hazardous waste.	The treatment requirements found at 40 CFR Part 264 and Part 265 Subparts I and J are incorporated in Nebraska Title 128 (hazardous waste regulations).	X			X
Closure and Post-Closure/Disposal of Soils 40 CFR Part 264 and Part 265 Subpart G	Applicable	Sets forth requirements for closure and post-closure care (including disposal of soils) for hazardous waste treatment facilities.	The closure and post-closure requirements found at 40 CFR Part 264 and Part 265 Subparts I and J are incorporated in Nebraska Title 128 (hazardous waste regulations).	X			X
Financial Assurance Requirements 40 CFR Part 264 and 265	Applicable	Regulations promulgated under Title 123 and Title 132, Chapter 8 also specify requirements that apply to financial assurance.	The financial assurance requirements found in 40 C.F.R. Part 264 and Part 265 are incorporated by reference in Title 128, Chapters 21 and 22.			X	X
40 CFR Part 6, Appendix A - Statement of Procedures on Floodplain Management and Wetlands Protection	Relevant and Appropriate	Policy and guidance for carrying out the provisions of Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands).	If there is no floodplain/wetlands impact identified based on the delineation of floodplains and wetlands, the remedial action may proceed without further consideration of the procedures in 40 CFR Part 6, Appendix A.			X	X

Statute and Regulatory Citation	ARAR Determination	Description	Comments	Medium: Groundwater	Type of ARAR		
					Chemical	Location	Action
STATE OF NEBRASKA ARARs							
Regulations Governing Water Well Contraction, Pump Installation and Water Well Abandonment Neb. Rev. Stat. §46-602, Title 178, Chapter 10, and Title 456, Chapter 12	Applicable	Groundwater wells must be registered with the Department of Natural Resources.	If the well is to be located in a groundwater management area, a permit is required from the local Natural Resources District prior to construction if it pumps more than 50 gpm. However, EPA is only required to meet the substantive requirements of said permit.	X			X
Regulations Governing Water Well Contraction, Pump Installation and Water Well Abandonment Standards Neb. Rev. Stat. §46-602 and Title 178, Chapter 10	Applicable	Relates to the licensure of water well contractors and pump installation contractors and to the certification of water well drilling supervisors, pump installation supervisors, natural resources groundwater technicians and water well monitoring technicians.	None	X			X
Water Well Standards and Contractor's Practice Act, Neb. Rev. Stat. §46-1201 to §46-1241, Title 178, Chapter 10, and Title 456, Chapter 9	Applicable	The purposes of the Water Well Standards and Contractors' Practice Act are to: (1) Provide for the protection of groundwater through the licensing and regulation of water well contractors, pump installation contractors, water well drilling supervisors, pump installation supervisors, water well monitoring technicians, and natural resources groundwater technicians in the State of Nebraska; (2) protect the health and general welfare of the citizens of the state; (3) protect groundwater resources from potential pollution by providing for proper siting and construction of water wells and proper decommissioning of water wells; and (4) provide data on potential water supplies through well logs which will promote the economic and efficient utilization and management of the water resources of the state.	None	X			X
Well Spacing Requirements Neb. Rev. Stat. §46-651 to §46-655	Relevant and Appropriate	Well spacing requirements.	None	X		X	X

Statute and Regulatory Citation	ARAR Determination	Description	Comments	Medium: Groundwater	Type of ARAR		
					Chemical	Location	Action
The Industrial Ground Water Regulatory Act Neb. Rev. Stat. §46-675 through 46-690 and Title 456, Chapters 4 and 7	Relevant and Appropriate	Requires a permit for the withdrawal and transfer of groundwater for other than domestic or agricultural use. The permit must be obtained prior construction of the extraction well(s). The permit program is administered by the NDNR.	EPA is only required to meet the substantive requirements of the groundwater use permit.	X			X
Municipal and Rural Domestic Groundwater Transfers Permit Act Neb. Rev. Stat. §46-638 to §46-650	Relevant and Appropriate	Relates to protective permitting for public water supplies.	EPA is only required to meet the substantive requirements of protective permitting for public water supplies.	X		X	X
Institutional Controls Nebraska Hazardous Waste Regulations, Title 128, Chapter 21 and 22; Integrated Solid Waste Management Regulations, Title 132, Chapter 3; and Nebraska Uniform Covenants Act, Neb. Rev. Stat. §76-2601 to 76-2613	Applicable	Deed Notice 1. A deed notice is required for hazardous wastes remaining on-site after closure in accordance with 40 CFR 264.119 and 265.119 and Title 128 – Nebraska Hazardous Waste Regulations, Chapter 21 and 22. 2. A deed notice is required for closed solid waste disposal areas in accordance with Title 132 – Integrated Solid Waste Management Regulations, Chapter 3. Environmental Covenant 1. An environmental covenant pursuant to the Nebraska Uniform Covenants Act Neb. Rev. Stat. §76-2601 to 76-2613 may be used for a site, that upon completion of the cleanup action, is not suitable for unrestricted land use.	Institutional controls are generally land use restrictions designed to restrict access, future use, and interference with a selected remedy for a contaminated area. They are typically methods to manage risk during the implementation of a remedy and do not eliminate risk entirely. An institutional control enacted as a remedy should be compliant with the Uniform Environmental Covenants Act pursuant to The Nebraska Uniform Covenants Act, March 2005, Neb. Rev. Stat. §76-2601 to 76-2613. For groundwater, the goal of an institutional control would be to prevent situations from occurring in which humans or animals might inadvertently consume or otherwise be exposed to contaminated groundwater. Groundwater in Nebraska is considered to be publicly owned. Property owners only have the right to use the groundwater underlying their property. There is no ability under Nebraska State law to restrict the use of groundwater by prohibiting access. Public entities with zoning authority may be able to restrict access to groundwater from certain surface areas within the zoning jurisdiction of the entity, but groundwater use cannot be prohibited, and existing wells could still probably continue as non-conforming uses. Condemnation might be a possibility to remove these existing wells from use. Some limitations on use may be established by a local Natural Resource District to protect the quantity, and in certain circumstances preserve water quality, but only if a Groundwater Management Area has been established pursuant to Neb. Rev. Stat. §46-656 et seq. This authority, however, cannot be used to restrict the use of contaminated groundwater. Long-term effectiveness and enforcement concerns make this component much less reliable than other methods of active remediation.	X		X	X

Statute and Regulatory Citation	ARAR Determination	Description	Comments	Medium: Groundwater	Type of ARAR		
					Chemical	Location	Action
Air Quality Regulations Title 129 Chapter 17, Section 001	Applicable	Depending on the size of the unit and the potential to emit criteria pollutants and/or toxic or hazardous pollutants, a pre-construction review and permit may be required under Title 129 (Air Quality Regulations) specifically, Chapter 17, Section 001. Potential to emit is defined in Title 129, Chapter 1, as the maximum capacity of a stationary source to emit a pollutant under its physical and operational design	A risk analysis may be required on a case-by-case basis. Depending on the potential to emit, a Class I or Class II operating permit may be required. See specifically Title 129, Chapter 5 for determining applicability. If applicable, EPA would only be required to meet the substantive requirements of an operating permit. BACT is required if the emissions unit has a potential to emit equal to or more than 2 1/2 tons/year of any hazardous air pollutant or an aggregate of 10 tons/year of hazardous air pollutants. See Title 129, Chapter 27, 002. It must be utilized continuously while the emissions unit is operating. If the emissions unit meets the threshold limits for construction/operating permits, annual emissions must be reported if requested by the Department. See Title 129, Chapter 6.	X	X	X	X
Disposal of Wastewater Treatment Residuals Title 128, Chapter 2	Relevant and Appropriate	The sludge generated from flocculation and sedimentation, reverse osmosis, enhanced oxidation, and precipitation are wastewater treatment processes would be a solid waste under Title 128, Chapter 2. For other requirements applicable to the sludge, see B. 2 through 8 above.	None	X	X		X
Disposal of Activated Carbon Used as Air Emission Control Title 128, Chapter 2	Relevant and Appropriate	If activated carbon is used as an air emission control, the spent carbon may be required to be handled as a hazardous waste in accordance with Title 128 requirements	The spent carbon, ion-exchange resin, and granular media meet the definition of solid waste in Title 128, Chapter 2. Air permits may also be required for carbon regeneration or reactivation depending on potential to emit (construction and/or operating permits - see Title 129). However, EPA would only be required to meet the substantive requirements of the construction and/or operating permit.	X	X		X
Integrated Solid Waste Management Regulations Title 132, Chapter 13	Relevant and Appropriate	If aerobic or anaerobic biological treatment is used for groundwater treatment, waste from the treatment process may be required to be handled and disposed of as special waste in accordance with Title 132 requirements.	None	X	X		X

Statute and Regulatory Citation	ARAR Determination	Description	Comments	Medium: Groundwater	Type of ARAR		
					Chemical	Location	Action
Disposal of Hazardous Waste Title 128, Chapter 4	Relevant and Appropriate	A hazardous waste determination must be made in accordance with Title 128, Chapter 4, 002. If material is a hazardous waste, it must be handled in accordance with all hazardous waste management requirements in Title 128, Chapters 8, 9, and 10.If material is hazardous waste, it must be disposed of in a permitted TSD facility as required under Title 128, Chapters 8, 9, and 10. However, generators subject to the requirements of Chapter 8 (conditionally exempt small quantity generator) have disposal options. The transporter must comply with the requirements of Title 128, Chapter 11.	If the material which caused the contamination was a hazardous waste then the closure and post-closure requirements of 40 CFR. Part 264 or Part 265, Subpart G, as incorporated by reference in Title 128, Chapters 21 and 22 are applicable. If the generator intends to store the hazardous waste for more than 90 days (more than 180 days for small quantity generators; or more than 270 days if a small quantity generator must transport the waste, or offer the waste for transportation over a distance of 200 miles or more) or intends to treat said waste on site, the requirements of Title 128, Chapters 12 through 15, 21, and 22 apply. If the generator is also acting as the transporter, then it must follow the transporter requirements found in Title 128, Chapter 11.	X	X	X	X
LDRs Title 128, Chapter 20	Relevant and Appropriate	On-site treatment of those wastes that are determined to be hazardous would have to be conducted in a tank or container meeting requirements of 40 CFR 264, Subparts I and J.	Would apply to treatment residuals.				X
Disposal of Nonhazardous Waste Title 132, Chapter 1	Relevant and Appropriate	Nonhazardous waste may be a special waste as defined in Title 132, Chapter 1 and the generator must follow the requirements of Title 132, Chapter 12, and may only be disposed at a licensed landfill which is operated and maintained in compliance with NDEQ regulations and that is approved to accept special waste. Department and landfill approval required.	None				X
Disposal of Surface Water During Excavation	Relevant and Appropriate	If sumps are necessary during excavation to dewater, the water to be discharged either to the surface of the ground or a stream, then a permit and/or discharge limits must be obtained from the Department in accordance with Title 119 (NPDES regulations), Title 121 (NPDES effluent guidelines and standards), and Title 117 (Surface Water Quality Standards) or Title 127 (POTW pretreatment rules and regulations). If the water is to be reinjected, it must be done in accordance with Title 122 (UIC regulations).	None		X		

Statute and Regulatory Citation	ARAR Determination	Description	Comments	Medium: Groundwater	Type of ARAR		
					Chemical	Location	Action
Rules and Regulations for Underground Injection and Mineral Production Wells Title 122	Relevant and Appropriate	The UIC Program issues and reviews permits, conducts inspections, and performs compliance reviews for wells used to inject fluids into the subsurface.	Infiltration and/or reinjection of groundwater and injection of substances or nutrients would require a UIC permit or review under Title 122 or review of plans and specifications under Title 123. Underground injection may also require an NPDES permit under Titles 119 and 121 based on the potential impact to groundwater. However, EPA would only be required to meet the substantive requirements of the UIC and NPDES permits.	X			X
Rules and Regulations for Design, O&M of Wastewater Treatment Works Title 123	Relevant and Appropriate	Flocculation and sedimentation, reverse osmosis, enhanced oxidation, and precipitation are wastewater treatment processes for which submission and review of plans and specifications and a construction permit are required.	None	X			X
Nebraska Pollutant Discharge Elimination System	Relevant and Appropriate	Any surface discharge of contaminated or treated water is subject to the requirements of Title 119 - Rules and Regulations Pertaining to the Issuance of Discharge Elimination System Permits, Title 121 - Effluent Guidelines and Standards, Title 117 – Nebraska Surface Water Quality Standards. Any reinjection of contaminated water or treated water is subject to the requirements of Title 122 - Rules and Regulations for Underground Injections and Mineral Production Wells and Title 118 - Ground Water Quality and Use Classification (Department of Environmental Quality).	If applicable, EPA would only be required to meet the substantive requirements of the NPDES permit.	X	X		
Nebraska Surface Water Quality Standards Title 117	Applicable	Establishes the water quality standards applicable to surface waters in the State of Nebraska, including wetlands.	None	X	X		

Statute and Regulatory Citation	ARAR Determination	Description	Comments	Medium: Groundwater	Type of ARAR		
					Chemical	Location	Action
Groundwater Quality Standards Title 118	Relevant and Appropriate	Establishes narrative and numerical standards for contaminants introduced to groundwater either directly or indirectly by human activity. Provides that any groundwater whose existing quality is better than the MCLs must be maintained at the higher quality; however the State may choose, after public notice and public hearing and based upon necessary economic or social development, to allow degradation that does not interfere with existing uses. Establishes a procedure for determining the needed action for groundwater pollution occurrences. This Protocol includes assessment of the degree and extent of the contamination, setting preliminary cleanup levels, and developing remedial actions.	The narrative and numerical requirements of Title 118 are relevant and appropriate to the groundwater at the Site. It is likely that any discharge limits would be based on groundwater quality standards because of the conjunctive relationship of groundwater and surface water. Under Title 118, a RAC of "1" is assigned automatically any time a public or private drinking water supply has been contaminated. Minimum requirements imposed upon the responsible party in a RAC-1 area include the cleanup of readily removable contaminants. Mitigation may also be required. If additional cleanup is not required, the remaining contaminated groundwater will be managed and monitored to prevent any further damage. Preliminary cleanup levels in RAC-1 areas are typically MCLs. If an MCL has not been established for a particular contaminant, the Department can consider EPA's Ambient Water Quality Criteria, Health Advisories, and other documents in setting the preliminary cleanup level. The level will be set at the concentration which is estimated to result in a 1 x 106 excess cancer risk or the laboratory detection limit, if higher and within an acceptable range. The timeframe for any required corrective action is established, subject to appeal with adequate justification, as the period of potential exposure in the absence of any remedial action or 20 years, whichever timeframe is less.	X	X		X
Flood Plain Management	Relevant and Appropriate	The Flood Plain Management Act, Neb. Rev. Stat. §31-1001 to §31-1031, and Title 258 – Rules Governing Flood Plain Management, govern certain activities occurring in flood plains.	None	X		X	X

Statute and Regulatory Citation	ARAR Determination	Description	Comments	Medium: Groundwater	Type of ARAR		
					Chemical	Location	Action
Endangered and Threatened Species	Relevant and Appropriate	The Nebraska Nongame and Endangered Species Act, Neb. Rev. Stat. §37-801 to §37-811 (recodified in 1998), and Title 163, Chapter 4, 012, require consultation with the Nebraska Game and Parks Commission regarding actions which may affect threatened or endangered species and their critical habitat (Nebraska Game and Parks Commission).	None	X		X	X

Notes:

ARAR = Applicable or Relevant and Appropriate Requirement
BACT = Best Available Control Technology
CFR = Code of Federal Regulations
EPA = U.S. Environmental Protection Agency
LDR = Land Disposal Requirement
MCL = maximum contaminant level
NCP = National Oil and Hazardous Substances Pollution Contingency Plan
NDEQ = Nebraska Department of Environmental Quality
NDHHS = Nebraska Department of Health and Human Services
NDNR = Nebraska Department of Natural Resources
NPDES = National Pollutant Discharge Elimination System
NRS = Nebraska Revised Statutes
OSWER = Office of Solid Waste and Emergency Response
POTW = Publicly Owned Treatment Works
RAC = Remedial Action Classification
RCRA = Resource Conservation and Recovery Act
SDWA = Safe Drinking Water Act
TSD = treatment, storage and disposal
UIC = Underground Injection Control
U.S.C. = U.S. Code
VOC = volatile organic compound

Appendix B

EPA/NDEQ Communications on the Proposed Plan

NEBRASKA

Good Life. Great Environment.

DEPT. OF ENVIRONMENTAL QUALITY

Pete Ricketts, Governor

AUG 21 2017

Ms. Mary Peterson, Director
U.S. Environmental Protection Agency Region VII
Superfund Division
11201 Renner Blvd.
Lenexa, KS 66219

RE: West Highway 6 & Highway 281 Site
NDEQ ID: 85059
Program ID: NEN000704738
Subject: Non-Concurrence Determination for OU 2 Proposed Plan

Dear Director Peterson:

The Nebraska Department of Environmental Quality (NDEQ) has reviewed the Proposed Plan, dated August 2017, for Operable Unit 2 (OU 2) of the West Highway 6 & Highway 281 Site (Site). Based on our review, the Department does not concur with the selected remedial alternative G3 (Groundwater Recovery, Treatment and Discharge at Leading Edge of Plume). This determination is based on the following reasons:

1. The selected G3 remedial alternative has an estimated restoration time frame of 30 years versus an estimated restoration time frame of 16 years for remedial alternative G4 (Groundwater Recovery, Treatment, and Discharge at Mid-plume and Leading Edge of Plume). This selection is contrary to recent EPA Headquarters' goals and objectives of accelerating the pace of cleanups, quicker restoration time frames, and the facilitation and promotion of redevelopment and reuse of on-site and downgradient properties.

2. The Department estimates that the selection of Alternative G3 would increase the State's future Operation & Maintenance obligations to approximately $3,627,000 more than would be incurred by the selection of Alternative G4.

Should you have any questions regarding this decision, please contact Land Division Administrator David Haldeman at 402/471-4219 or Remediation Section Supervisor Mike Felix at 402/471-2938. Thank you for your consideration in this matter.

Sincerely,

Jim Macy
Director

cc: Preston Law, EPA
Brian Zurbuchen, EPA
Pam Houston, EPA
Joe Patterson, City of Hastings
David Wacker, City of Hastings

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7
11201 Renner Boulevard
Lenexa, Kansas 66219

SEP 2 8 2017

Mr. Jim Macy
Director
Nebraska Department of Environmental Quality
1200 N Street, Suite 400
Lincoln, Nebraska 68509-8922

RE: Response to Non-concurrence on EPA's Proposed Plan
West Highway 6 & Highway 281 site, OU 2

Dear Mr. Macy:

The U.S. Environmental Protection Agency received the Nebraska Department of Environmental Quality's (NDEQ's) August 21, 2017 letter that expressed its concerns regarding the Proposed Plan for the West Highway 6 & Highway 281 site (Site). The EPA's Proposed Plan, made available to the NDEQ and the public August 15, 2017, identified the Preferred Alternative and provided the rationale for an interim remedial action to address the approximately two-mile long contaminated groundwater plume that extends downgradient from the Site's source, the former Dana Corporation facility. The plume constitutes Operable Unit 2 (OU 2) of the Site. The Proposed Plan also included summaries of other cleanup alternatives evaluated for use at the Site. The main concerns NDEQ identified in its letter were that the EPA's Preferred Alternative, Alternative G3, would take longer to restore the aquifer and be a greater financial burden to the state than Alternative G4.

The procedures set forth in the NCP 300.430(f) guide the EPA's selection of the remedial alternative based on a detailed evaluation of the nine criteria according to 300.430(e)(9). These procedures group the nine criteria into three categories: threshold criteria, primary balancing criteria, and modifying criteria. As presented in the Proposed Plan, three remedial alternatives were evaluated in detail:

- Alternative G1 – No action. Required as a baseline for comparison against other alternatives;
- Alternative G3 – Groundwater Recovery, Treatment and Discharge at Leading Edge of Plume;
- Alternative G4 – Groundwater Recovery, Treatment and Discharge at Mid-plume and Leading Edge of Plume.

A summary of the EPA's detailed evaluation of the three remedial alternatives was presented in the Proposed Plan.

The comparative analysis of Alternatives G3 and G4 presented in the Proposed Plan determined that both Alternatives G3 and G4 met the threshold criteria. And with the exception of the present value cost, the Alternatives satisfied the balancing criteria equally well. However, taking into consideration the state's key concerns (i.e., one of the two modifying criteria) regarding the state's cost share and the cleanup timeframe, the EPA has determined selection of Alternative G4, instead of Alternative G3, is warranted. Both alternatives employ the same treatment technology; however, the cost of operating and maintaining Alternative G4 (borne by the state) is less burdensome on the state, and has a shorter clean up time frame.

Both Alternatives G3 and G4 were presented in detail in the proposed plan which was subject to public review and comment. While Alternative G3 was presented in the proposed plan as the EPA's Preferred Alternative, the purpose of the public comment period is for the EPA to ascertain the considerations and preferences of the community and state. In this instance, the state strongly preferred Alternative G4. Based on the discussion above, the EPA believes that this is a change that could have been reasonably anticipated by the public and considers the statutory requirements - ensuring that the public has the opportunity to comment on major remedy selection decisions – to have been met by the original public comment period that began August 15, 2017, and the remedy selected comports with the public comment received.

If you have any questions, please call me at (913) 551-7101.

Sincerely,

Mary P. Peterson

Mary P. Peterson
Director
Superfund Division